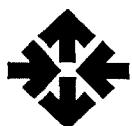
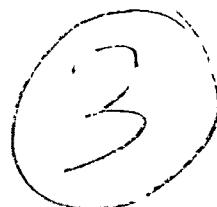


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A Unique Endowment to Women Primary Teacher Education

[It was a stroke of divine that my old classmate of B Ed batch of 1957 sounded me as to whether I would accept an invitation to inaugurate a newly constructed Primary Teacher College (PTC) building in his town where he had served in the past as the principal of the college. I was in two minds since during the month of January '05, Gujarat had been experiencing rather a severe spell of cold wave and the Muhurt (auspicious time) for inauguration was fixed in the early morning. That meant I had to arrive in the town, namely Kapadwanj, the previous night and stay with him so that we could be present at the spot at sharp 8 30 am the next day]

On the other hand, after the retirement and involvement with this journal, my inner voice has always nudged me not to let go any opportunity to see the conditions prevailing at the grassroots level, especially as PIE's original purpose was to disseminate educational information to educational functionaries in the remote corners of the country. Finally, I decided to participate in the function more with curiosity for knowing reality at the micro level rather than to oblige an old friend.

The next day, when we braved the cold wave with virtually padding ourselves with warm clothes and reached the spot for Muhurt, there were hardly any people except the principal of the PTC to meet us. We were seated on the chairs in open with hands in the pockets for a little warmth. Gradually, other important persons of the Mandal and, thereafter, two frail women, who were promptly attended to with respect by one and all arrived for the ceremony. My friend whispered in my ear that those two ladies were the donors. However, I was shell shocked to see them so thinly clad wearing slippers and, therefore, suggested that shawls be wrapped around them lest they might catch cold. While the older one reluctantly covered her, the younger one refused to do so. They both were so unassuming, so simple and so plain that I could not believe that they were the real donors. Meanwhile, my friend further informed me that they worked as teachers in a primary school there and they were donating their entire life's savings to erect these two structures. I was indeed overwhelmed. After a while the elder sister returned the shawl, thereby revealing her austere aspect of life to me. I mean to covey here that they both must have saved every paisa to sustain life later in the old age. I simply marveled at the very idea that such simple folks could do things that many of us, though more fortunate and capable, prefer not do it. What moments in life can be nobler to watch than to witness an event like this!

We, the dignitaries and highbrow professionals, shared the same dais and, of course, delivered impressive hyperbole speeches with the audience clapping. Nonetheless, throughout the inaugural function, they sat there in silence, at the end came their humble and shy request to speak a few words. And the elder sister spoke on

behalf of the family. I was so moved by her simple, rustic and straight yet touching account of how they took the decision to donate a big sum of Rs 11,00,000/- for the cause of women primary teacher education that I instantly decided to share the unusual unfolding of the story with our readers. Her short speech produced below tells a tale that seems unbelievable in the time when all kinds of institutions are mushrooming in the name of service to the cause of education but in reality plundering money and creating power centers for the benefit of a few. In the pessimistic and depressive scenario of education in the country, teacher education and primary teacher education in particular, this is indeed an oasis to which one would like to turn to for solace and inspiration. As long as there are people like these two simple folks, primary teacher education will not only sustain but also flourish while the theories of teaching may meet premature demise. —E I C]

While offering prayers to God or remembering Him in solitude, there dawns a holy moment in our life, when we experience a noble thought that He simultaneously inspires you to execute it

Our whole life has been devoted to the cause of women education. Consequently, we feel that the time has arrived to donate for the same cause (of women education). And God has given this inspiration to us to do something for it. Therefore, since God has instilled this thought for donating, a strong desire has besieged us to contribute back to our chosen field

The Kapadwanj Women Primary Teacher Education College was to be started and the first women hostel was to be constructed. For that, our brother—Snibhai on his own approached the President of the Kapadwanj Kelavani Mandal expressing our desire to donate Rs 4,00,000/- for that purpose. The members of the Mandal accepted our offer and agreed to name the hostel as Dhanuben and Jasudben Harilal Vaidya PTC Hostel.

Thereafter, we came to know that the Mandal needed Rs 15,00,000/- for the Primary Training College itself. They initiated their moves to raise this amount both at Kapadwanj and Mumbai

We further thought over the issue. Since we had enough money and resources to sustain our remaining life (after the retirement), we again informed the Mandal that we were willing to contribute to the tune of Rs 8 to 10,00,000/- for the college also. They readily accepted our offer and a final payment of Rs. 11,00,000/- was donated to the construction of both the buildings and the college was named as Vaidya Harilal Maganlal Mahila PTC College. In this way, with the blessings of God, our dream got fructified.

We wish and pray that the women teacher trainees receive good quality education; similarly they impart good quality education to their students and inculcate noble values in them so that they become good citizens of this country. When this happens, we would be satisfied that our donation has served the right purpose.

In the end, the Mandal has appreciated our donation and organized this function to felicitate both of us for our contribution. For that, we are indeed very, very grateful to it.

Om, Shanti, Shanti (Be peace on us, Be peace on us).

Dhanuben and Jasudben

Anomalies, Exceptions and Creativity: A Perspective from Darwin's Natural History

LOUIS M. SMITH

[In the April 2004 Issue, the author attempted to squeeze 'Darwin into 2000 words' By now, PIE readers interested in the conceptualisation of Dr Smith would find this new essay more illuminating on his search for relating the social science method to the scientific method via the biographical method, of course, with the help of Charles Darwin, undoubtedly one of the greatest scientists of our time]

The Issue

Whenever several strands of inquiry come together, by intention or the happy accident of serendipity, it is a time for rejoicing. In this instance, the mix was several-fold. First, I was pursuing a continuing concern with the history of social science—especially naturalistic inquiry. The multiple forms of qualitative inquiry—participant observation, ethnography, action research—are a broad theme that has preoccupied me for many years (Smith, 1968, 1979 & 1990). The special emphasis on history and life history has been growing more recently (Smith, 1990). Second, I was continuing inquiry into the biography of Nora Barlow and the thought of Charles Darwin (Smith, 1987, 1993 & 1997). For over a decade and a half this biographical work has been an agenda item, one that seemed to grow and grow and never end. And third, I was grappling with the multiple facets and domains of creativity in everyday life, science, art, and education—curriculum, teaching, learning and evaluation. That, too, was a program agenda that has had no end.

This particular essay began as a four-page note, a needling of my qualitative research colleagues who used words like *anomalies*, *exception* and *outliers*. Words I thought were close synonyms. With a smile, I asked why they didn't reference an important naturalistic scientist such as Charles Darwin in their discussions, for 150 years ago he used some similar conceptual labels. My four pages grew and grew as I began exploring historically this one small item in these large domains of my concerns. The phenomenon of anomalies and exceptions appears in the work of scientists of several sorts, but the major focus here is Charles Darwin. As a sometime educational ethnographer and action researcher, I have always thought anomalies were an important issue in carrying out investigations in the study of classrooms, schools, curricula and school systems. But I have never tried for a larger rational of the ideas. Now, in reading some of Darwin in connection with the

biography of Nora Barlow (Smith, In process), some of the roots of the idea of exceptions have become apparent. Lurking always in the background was the idea and issue of creativity. And one thing has led to another—once again! This essay tries for a kind of synthesis and integration. It remains a personal document toward a personal perspective. Although the essay draws from a number of sources, my hope is that it will stimulate further methodological discussion, especially among qualitative inquirers and action researchers in professional education and ethnographers and natural historians in social, psychological and biological science.

Early Recognition and Acknowledgement of the Idea: The Omniscient Charles Darwin

Exceptions and Creativity

Recently, while reading Francis Darwin's chapter "Reminiscences" in Volume I of his *The Life and Letters of Charles Darwin* (1887), the issue of exceptions arose. Francis comments regarding his father

A few of his characteristics, bearing especially on his mode of working, occur to me. There was one quality of mind that seemed to be of special and extreme advantage in leading him to make discoveries. It was the power of never letting exceptions pass unnoticed. Everybody notices a fact as an exception when it is striking or frequent, but he had a special instinct for arresting an exception (p. 148) (Emphasis added)

Francis, in this chapter of reminiscences, has a general category he labels "*mental characteristics*." He seems a short step away from a kind of "trait" theory of personality and perhaps just a few steps away from what today would probably be labeled "cognitive theory." The noting of exceptions and its relation to creativity, "*leading him to make discoveries*," were essential components of this larger view. The argument Francis is making shifts slightly with the next sentence

A point apparently slight and unconnected with his present work is passed over by many a man almost unconsciously with some half considered explanation, which is in fact no explanation (p. 148)

Implicitly he seems to be making the case for Darwin having a number of ideas and activities underway and the exception relates to one or another of those ideas not currently in focus. Francis continued

It was just these things that he seized on to make a start from. In a certain sense there is nothing special in this procedure, many discoveries being made from it. I only mention it because, as I watched him at work, the value of this power to an experimenter was so strongly impressed upon me (1887, pp. 148-149)

As I read, reflect, and interpret these initial comments by Francis Darwin of his father Charles, I am led to the beginnings of a theory of antecedents and consequences of creative scientific activity. Further, my thinking harks back to an earlier very influential book, in psychology, McClelland's (1951) *Personality*. Late

in that book he presents an integrative summary titled "predicting the concrete act," in which he develops a process analysis of the person in action. We used those ideas in an early educational psychology textbook (Smith & Hudgins, 1964). I seem to be approaching that focus once again. Figure 1 abstracts these initial thoughts of F. Darwin on C. Darwin. The figure can be read as a kind of soft determinism—if this, then that. The arrows represent a too simple kind of liner causality, that is, a sequencing of antecedents and consequences. These ideas as an underlying framework were voiced most clearly for me in Zetterberg's *On Theory and Verification in Sociology* (Rev. 1963).

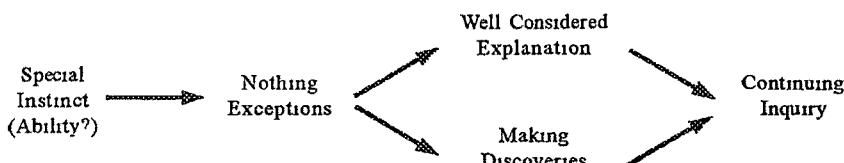


Figure 1 A Beginning Antecedents and Consequences Theory of Exceptions from Darwin

As a collaborator, Francis worked for many years with his father and had an unparalleled opportunity for observing him at work. In a sense I am arguing a methodological sub-theme that ethnography and biography seem to be playing themselves out in his essay, and his essay has become data for my analysis and interpretation.

Relation to Motivation and Personality

Other observations and ideas seem a part of Francis' implicit yet evolving theory of research creativity as exhibited by Charles Darwin. These ideas go well beyond what is usually seen as 'cognitive.' Francis' move seems toward a more general conception of the motivation and personality of the research scientist. In my view this is the point where my original 'four page note' becomes a much larger essay including the intellectual, personal, and social context for the conception of 'anomalies, exceptions, and creativity.' Francis Darwin provides a major starting point for this more general theorizing.

Another quality that was shown in his experimental work was his power of sticking to a subject, he used to almost apologize for his patience, saying that he could not bear to be beaten, as if this were rather a sign of weakness on his part

"Patience" seems hardly the concept, rather **competitiveness with nature** seems closer. But simple competitiveness was only part of the story, for Francis continues

He often quoted the saying "It's dogged as does it," and I think doggedness expresses his frame of mind almost better than perseverance. Perseverance seems hardly to express his almost fierce desire to force the truth to reveal itself. He often said that it was important that a man should know the right point at which to give up an inquiry. And I think it was his tendency to pass this point that inclined him to apologize for his perseverance, and gave the air of doggedness to his work (p. 149, emphasis added)

“Doggedness” seems an extreme amount of a variable that might be labeled **intensity of motivation**. Patience and perseverance seem lesser amounts of intensity. As a kind of action, doggedness imbues both cognitive and experimental inquiry with a kind of relentlessness. One wonders about the origins, the ‘if this, then that’ of such a disposition.

Powerful Theorizing and Exceptions

Francis returns next to elaborate another important cognitive point about the relations of the exception to other qualities of Darwin’s thinking.

He often said that no one could be a good observer unless he was an active theorizer. This brings me back to what I said about his instinct for arresting exceptions. It was as though he were charged with theorizing power ready to flow into any channel on the slightest disturbance, so that no fact, however small could avoid releasing a stream of theory, and thus the fact became magnified in importance (p 149) (Emphasis added)

From the time Darwin was a young man on H M S Beagle, he wrote his sisters about the difficulty in “reasoning” and his need to organize particulars into larger general statements (Barlow, 1946, Smith, 1987). He commented this way in April of 1836, toward the end of the Beagle voyage

Whilst we are at sea & the weather is fine, my time passes smoothly because I am very busy. My occupation consists in rearranging my old geological notes, the rearranging generally consists in totally rewriting them. I am just now beginning to discover the difficulty of expressing one’s ideas on paper. As long as it consists solely of description it is pretty easy; but when reasoning come into play, to make a proper connection, a clearness and a moderate fluency, is to me as I have said, a difficulty of which I had no idea. (Barlow, 1946 Letter 33, 4/29/1836, p 138, emphasis added)

It seems now that Francis is observing a more mature Charles and Francis is presenting us with major concepts, “theorizing power,” and a kind of cognitive flexibility, “ready to flow into any channel.” In effect, he has the beginnings of a theory of antecedents in the noting of exceptions—and also the consequences in the changing importance of the fact per se, “magnified in importance.” Assuming the potential truth of the hypothesis, one wonders of the mechanisms, the connecting processes within an implicit cognitive theory such as the one Francis Darwin is creating.

In the next sentence, Francis adds another conceptual element to his theorizing

In this way it naturally happened that many untenable theories occurred to him, but fortunately his richness of imagination was equaled by his power of judging and condemning the thoughts that occurred to him (p 149, emphasis added)

“Naturally happened” is a convenient label for hiding another important set of possible hypotheses. Perhaps it is the ease in which the intellectual activities happened. “Richness of imagination,” another way of stating some of the elements,

is tempered by critical thought, judgment, and evaluation that have entered the argument. These seem related but different aspects of Darwin's cognitive repertory. One might argue that Darwin is focusing on what others might call intuition.

As Francis Darwin's views of Charles' intellectual activities become more and more complicated it seems appropriate to pause briefly and try for another initial synthesis. Figure 2 presents my interpretation of the potential hypotheses explicit and implicit in Francis Darwin's account. I have labeled this second model "A Tentative Extension of a Theory of Exceptions in Creativity." It extends Figure 1. It mixes Francis Darwin's language with some of my own language.

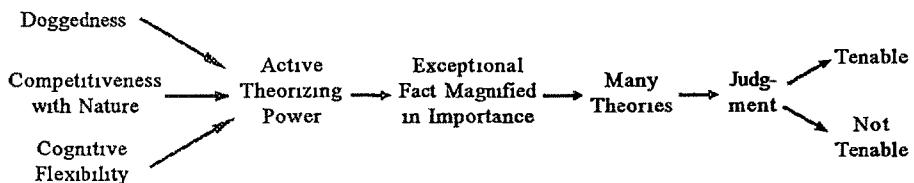


Figure 2 A Tentative View of Darwin's Theory of Exceptions in Creativity

Almost parenthetically, a comment by Darwin in a letter to Fawcett in 1861 extends Darwin's view of theorizing in the context of observation. In a sense it almost seems to subsume the principle of exceptions.

How profoundly ignorant B must be of the very soul of observations! About thirty years ago there was much talk that geologists ought only to observe and not theorize, and I well remember some one saying that at this rate a man might as well go into a gravel-pit and count the pebbles and describe the colours. How odd it is that anyone should not see that all observation must be for or against some view if it is to be of any service. (Burkhart et al., 1994, vol. 9 p. 269)

Theorizing had multiple purposes for Darwin

Justness, Fool's Experiments and Pleasure

Francis' account continues. In the next sentence of the paragraph came another kind of action and another quality of mind, less often identified, which can be entered into a theory of research creativity.

He was just to his theories, and did not condemn them unheard; and so it happened that he was willing to test what would seem to most people not at all worth testing. These rather wild trials he called "fool's experiments," and enjoyed extremely (p. 149) (Emphasis added)

Being "just" to a theory is a rare way of phrasing an issue in scientific discourse. Courage of convictions is another element. Darwin's giving a lovely name, "fool's experiments," to a phenomenon is another indication that he was both consciously involved and fanciful. Pleasure and motivation have returned in another guise. The three concepts are linked to two hypotheses "being just" leading to trials called "fool's experiments" which in turn led to or produced "enjoyed immensely."

Francis continued in the next sentence of the same paragraph with a striking illustration

*As an example I may mention that finding the cotyledons of *Biophytum* to be highly sensitive to vibrations of the table, he fancied that they might perceive the vibrations of sound and therefore made me play my bassoon close to a plant (pp 149-150)*

The playfulness and humor within Darwin's thinking contrast with the seriousness of the issue under investigation

Varied Research Methods

In the next long paragraph, Francis makes a series of important observations as well as a number of interpretations about Charles' ways of working as a scientist. They continue to provide a context for our major point on anomalies and exceptions. The first sentence combines two potentially conflicting ideas and interpretations

The love of experiment was very strong in him, and I can remember the way he would say, 'I shan't be easy till I have tried it,' as if an outside force was driving him (p 150)

To have a love for something, yet to be driven as by an outside force seems an anomaly in itself. A conscious desire enhanced by an unconscious drive?

Further contrasts appear in the next sentence of the same paragraph as Francis continues to mix his observations and speculations about his father's motivations related to the scientific enterprise

He enjoyed experimenting much more than work that only entailed reasoning and when he was engaged on one of his books which required arguments and the marshaling of facts, he felt experimental work to be a rest or holiday (p 150)

Francis Darwin then illustrates with work on the fertilization of orchids while doing the book *Variations of Animals and Plants* and experimenting with *Drosera* as a respite from writing *Descent of Man*. He ends the paragraph with a comment about Darwin's early work on the Beagle

And I have heard him mention that the Geology of South America gave him almost more pleasure than anything else. It was perhaps this delight in work requiring observation that made him value praise given to his observing powers almost more than appreciation of his other qualities (p 150)

To me, these last several paragraphs are conceptually highly provocative, yet a quagmire for theoretical integration. Francis Darwin's observations of his father

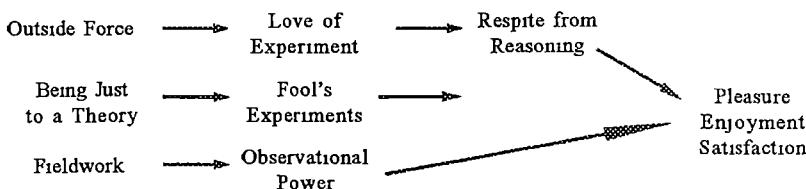


Figure 3. Antecedents of Darwin's Pleasure, Enjoyment and Satisfaction in Inquiry

provide further context for our interest in “anomalies” and “exception” It is almost as though the process of noting exceptions is nested within this larger personal framework of Darwin as a scientific investigator and person

Further Context, Darwin’s Literature Reviewing

These days, what is typically called “the literature review” takes on a very different set of connotations in Francis Darwin’s account of his father’s treatment of books, pamphlets, and journal articles Procedures for reading and thinking mix with the physical handling of the materials and present powerful images of Darwin’s intellectual work activities

For books he had no respect, but merely considered them to be tools to be worked with. Thus he did not bind them, and even when a paper book fell to pieces from use, as happened to Muller’s ‘Befruchtung,’ he preserved it from complete dissolution by putting a metal clip over its back. In the same way he would cut a heavy book in half to make it more convenient to hold. He used to boast that he had made Lyell publish the second edition of one of his books in two volumes, instead of in one, by telling him how he had been obliged to cut it in half. Pamphlets were often treated even more severely than books, for they would tear out, for the sake of saving room, all the pages except the one that interested him. The consequences of all this was, that his library was not ornamental, but was striking from being so evidently a working collection of books (pp. 150-1)

An instrumental quality existed **Voraciousness, vigor and insatiableness**, seems a possible way of phrasing his attack on the literature relevant to the issues and ideas under consideration

Francis continued He was **methodical** in his manner of reading books and pamphlets bearing on his own work” (p. 151) One shelf held the unread, another for books read and un-cataloged, and notes on “only skimmed” As the read books piled up he would comment “We really must do these books soon” The cataloguing led to more marginal notes, abstracts written, and filing under one or more subjects The detail that Francis presents is evocative of vivid images

In each book, as he read it, he marked passages bearing on his work. In reading a book or pamphlet, &c., he made pencil-lines at the side of the page, often adding short remarks and at the end made a list of the pages marked. When it was to be catalogued and put away, the marked pages were looked at, and so a rough abstract of the book was made. This abstract would perhaps be written under three or four headings on different sheets, the facts being sorted out and added to the previously collected facts in different subjects (pp. 151-152)

But in my words, this intense personal intellectual interaction with the ideas in the available literature involved multiple intellectual activities marking passages, making comments in margins, cataloguing and abstracting was not all. The aggressive attack continued

He had other sets of abstracts arranged, not according to subject, but

according to periodical When collecting facts on a large scale, in earlier years, he used to read through and make abstracts, in this way of whole series of periodicals (p 152)

The magnitude of this effort seems considerable

These materials were grouped into “portfolios” and stored on shelves next to the fireplace. From the notes and folders, his new books would arise

In writing a book he would spend much time and labour in making a skeleton or plan of the whole and in enlarging and sub-classing each heading as described in his ‘Recollections’ I think this careful arrangement of the plan was not at all essential to the building up of his argument, but for its presentment and for the arrangement of his facts (p 152)

That seems a strange set of observations and interpretations. Presumably the argument was clear in his head and what was needed was a careful arrangement and presentation, a presentment, presumably again for the convincing of his readers. Figure four abstracts and summarizes my interpretation of Francis Darwin’s observations and interpretations

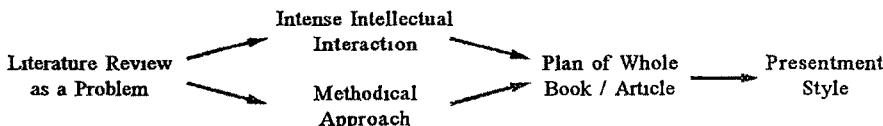


Figure 4. Style of the Literature Review as an Intellectual Problem

Once again, I would pause in the account of Francis Darwin, and try for a tentative synthesis of the ideas under discussion. Figure 5 presents a number of non-intellectual personality dispositions influencing his pursuit of exceptions and ultimately his research creativity. Much of this seems to be generated by his patience, perseverance and doggedness

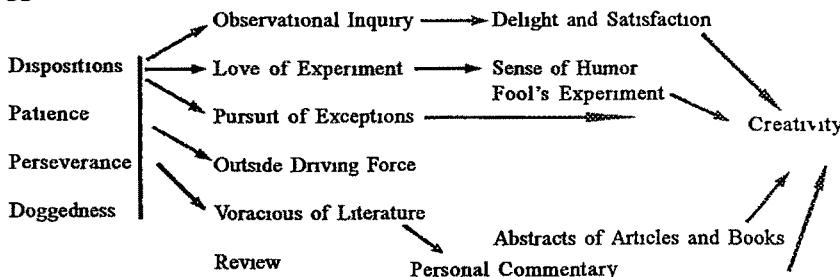


Figure 5. Non-intellectual Dispositions, Exceptions, and Creativity

Writing Behaviour as Significant Context

According to Francis, Charles Darwin’s writing habits evolved over the years. These habits give a context for the kind of cognitive intellectual activities that were occurring

It was only within the last few years that he adopted a plan of writing which he was convinced suited him best, and which is described in the 'Recollections', namely, writing a rough copy straight off without the slightest attention to style. It was characteristic of him that he felt unable to write with sufficient want of care if he used his best paper, and thus it was that he wrote on the backs of old proofs or manuscript. The rough copy was reconsidered and a fair copy was made. For this purpose he had foolscap paper ruled at wide intervals, the lines being needed to prevent him writing so closely that correction became difficult. The fair copy was then corrected and was recopied before being sent to the printers (p 153)

Not until the proofs were back did the seriously entertain thoughts of style. Suggestions would arrive from his wife Emma and in later years from his daughter Henrietta Litchfield, and, after her marriage, his son Francis assumed some of the responsibilities. Francis cites a poignant paragraph from one of his sister Henrietta's letters

This work was very interesting in itself, and it was inexpressibly exhilarating to work for him. He was always so ready to be convinced that any suggested alteration was an improvement, and so full of gratitude for the trouble taken. I do not think that he ever used to forget to tell me what improvement he thought I had made, and he used almost to excuse himself if he did not agree with any correction. I think I felt the singular modesty and graciousness of his nature through thus working for him in a way I never should otherwise have done (p 154)

With his family Darwin seemed always to have an easy and modest interactional style. That made him an enjoyable collaborator. In addition it gave him a formidable set of resources for his wife Emma, his daughter Henrietta and his son Francis were all very talented individuals. A granddaughter, Gwen Darwin Raverat in her *Period Piece A Cambridge Childhood* (1952) recounts innumerable family stories that carry the same emotional tone

After several long paragraphs on Darwin's writing style and the pains he took to be simple and clear in his prose, Francis returns to the mix of writing and social relations with colleagues and other readers as these issues bear on Darwin's thinking processes

His courteous and conciliatory tone towards his reader is remarkable and it must be partly this quality which revealed his personal sweetness of character to so many who had never seen him. I have always felt it to be a curious fact, that he who has altered the face of Biological Science, and is in this respect the chief of the moderns, should have written and worked in so essentially a non-modern spirit and manner. He was a Naturalist in the old sense of the word, that is, a man who works at many branches of science, not merely a specialist in one. Thus it is, that, though he founded whole new divisions of special subjects—such as the fertilization of flowers,

insectivorous plants, dimorphism, &c –yet even in treating these very subjects he does not strike the reader as a specialist. The reader feels like a friend who is being talked to by a courteous gentleman, not like a pupil being lectured by a professor (pp 155-156)

To me, as a latter day reader, that is a remarkable paragraph in its account of the interpersonal behaviour of a world-class scholar. The nature of a “*Naturalist in the old sense of the word*” cries out for more biographical detail on Darwin and his naturalistic colleagues of the time. The specialist par excellence who does not write as a specialist seems another anomaly needing exploration.

With a telling illustration, the paragraph shifts a bit in focus and tone and the image of Darwin changes toward another aspect of the integration of a personal and a cognitive style. Francis Darwin is no longer “just” observing his father, he is making sweeping interpretations and generalizations.

The tone of such a book as the ‘Origin’ is charming and almost pathetic, it is the tone of a man who, convinced of the truth of his own views, hardly expects to convince others, it is just the reverse of the style of a fanatic, who wants to force people to believe. The reader is never scorned for any amount of doubt which he may have imagined to feel, and his skepticism is treated with patient respect. A skeptical reader, or perhaps even an unreasonable reader, seems to have been generally present to his thoughts. It was a consequence of this feeling, perhaps, that he took much trouble over points which he imagined would strike the reader, or save him trouble, and so tempt him to read (p 156)

One wonders what Charles would have said about all this and whether this had been a conversational topic between the two of them.

Francis continues with several long paragraphs about Charles’ gentle and supportive relations to his colleagues and what they had written. He then makes a mix of observation, interpretation and judgment about Charles’ social, intellectual and professional activities.

His respectful feeling was not only morally beautiful, but was I think of practical use in making him ready to consider the ideas and observations of all manner of people

It was a great merit in his mind that, in spite of having so strong a respectful feeling towards what he read, he had the keenest of instincts as to whether a man was trustworthy or not. He seemed to form a very definite opinion as to the accuracy of the men whose books he read, and made use of the judgment in his choice of facts for use in argument or as illustrations. I gained the impression that he felt this power of judging of a man’s trustworthiness to be of much value (p 157 emphasis added)

Conditions that facilitate “making him ready to consider the ideas and observations” of others is an important hypothesis regarding creativity. Similarly the judgment “as to whether a man was trustworthy” helped in deciding how to make and elaborate

evidence in an argument is another striking hypothesis. These observations and interpretations take us from reading and writing style to much larger issues in cognition and creativity. In effect I am raising the issue of the much broader context of anomalies, exceptions and discrepant cases.

Finally Francis raises the much-debated topic of his father's ill health, a condition that never left him through his long life. The major point I would make here is Francis' statements of the helpful and supportive role played by Charles' wife Emma, who shielded and protected him from all the interruptions and annoyances that were presented to him. While the contribution to his energy and his capacity for creative work may seem self evident, it remains a major point in any analysis of Darwin's thought.

By way of summary, a final figure-theoretical model is presented to capture the ideas presented by Francis Darwin regarding Darwin's writing style as part of his mental characteristics and activities. For purposes of this discussion the final figure is arranged as context for the major conception of anomalies and exceptions and their antecedents and consequences.

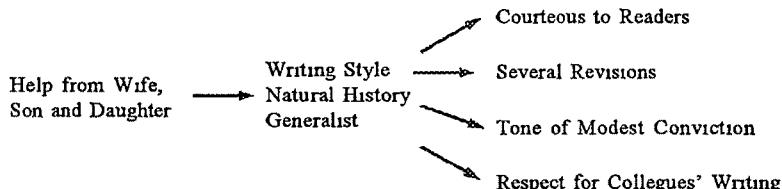


Figure 6 Darwin's Writing as Interactional Cognitive Activity

Unwittingly, so it would seem, Francis Darwin was speaking to, if not developing, the beginnings of a theory of scientific creativity with his father as the central figure of the case. In the "Reminiscences" chapter he has much to say about this incipient theory. Though this theory might seem to belong elsewhere, rather than in a pursuit of anomalies and exceptions, I have raised it here as more of the broader theoretical context of the issues of anomalies and exceptions, and the relationships with creativity.

For further context of these remarks it should be said that Francis was an eminent biologist in his own right and also a major figure in the history of science as he prepared, edited, and published monographs and books of Charles Darwin. But Francis Darwin was not a psychologist nor social scientist, the stance and interpretation at issue here.

The Irascible William Bateson: Analyst and Critic

Bateson was one of the major biologists in England at the turn of the century, the coiner of the term "genetics" and the most important proponent of Mendelian thought in European biology. He pursued Darwin's thought analytically and critically. He helps bring closure to the issues at hand in this essay. One of Darwin's granddaughters, Nora Barlow, was a student and colleague of his at Cambridge University (Barlow, 1913 and 1923). He was a brilliant and controversial figure as well. One commentator believed he would have independently arrived at Mendel's

principles if they hadn't been rediscovered in the first years of the 20th Century Bateson, too, spoke of exceptions in scientific work. The occasion was his inaugural address in October of 1908 as professor of biology at Cambridge University. The general topic was *The Methods and Scope of Genetics* (1908). The idealism, optimism, and visionary quality of the lecture flows easily in this own words

You will be aware that the claims put forward in the name of Genetics are high, but I trust to be able to show you that they are not high without reason. It is the ambition of every one who in youth devotes himself to the search for natural truth, that his work may be found somewhere in the main stream of progress. So long as he keeps something of the limitless hope with which his voyage of discovery began, will his courage and his spirit last

He continues

In research as in all business of exploration, the stirring times come when a fresh region is suddenly unlocked by the discovery of a new key. Then conquest is easy and there are prizes for all. We are happy in that during our own time not a few such territories have been revealed to the vision of mankind. I do not dare to suggest that in magnitude or splendour the field of Genetics may be compared with that now being disclosed to the physicist or the astronomer, for the glory of the celestial is one and the glory of the terrestrial is another. But I will say that for once to the man of ordinary power who cannot venture into those heights beyond, Mendel's clue has shown the way into a realm of nature which for surprising novelty and adventure is hardly to be excelled

A new paragraph with one long sentence follows

It is no hyperbolic figure that I use when I speak of Mendelian discovery leading us into a new world, the very existence of which was unsuspected before (1980, pp 2-4)

A decade or two later, Morgan was to find a mutant fruit fly and open a new era of genetics research, and four or five decades later Crick and Watson would astound the world with a three page article in *Nature* reporting on the double helix. And now genome mapping projects defy reason and imagination in their size and scope. Unwittingly, Bateson's visions that at the time might have seemed outlandish now flower magnificently.

But I want to stay with Bateson and the special topic of anomalies, exceptions and deviant cases. As he develops his ideas for a general intellectual audience he sketches the known knowledge of genetics revealed by the new "experimental breeding" of plants and animals. As he says, the method "enables us to put questions to Nature which never have been put before. "She, it has been said, is an unwilling witness" (p 20). Gradually he approaches the issues of this essay.

As we proceed, like our brethren in other sciences, we sometimes receive

answers which seem inconsistent or even contradictory. But by degrees as sufficient body of evidence can be attained to show what is the rule and what the exception. My purpose here today must be to speak rather of the regular than of the irregular

Once clear exception I may mention Castle finds that in a cross between the long-earedlop-rabbit and a short-eared breed, ears of intermediate length are produced and that these intermediates breed approximately true (p. 21)

Then comes the key paragraph for our purposes

*Exceptions in general must be discussed elsewhere. Nevertheless if I may throw out a word of counsel to beginners, it is **Treasure your exceptions!** When there are none, the work gets so dull that no one cares to carry it further. Keep them always uncovered and in sight. Exceptions are like rough brickwork of a growing building which tells that there is more to come and shows where the next construction is to be (p. 22 Emphasis added)*

In that powerful paragraph, he makes a strong suggestion to beginners in science, and then he accents both the motivational and cognitive elements in scientific inquiry. By treasuring one's exceptions one stays with the inquiry through dull periods and suggests the future direction if not scaffolding of the intellectual theory one is building

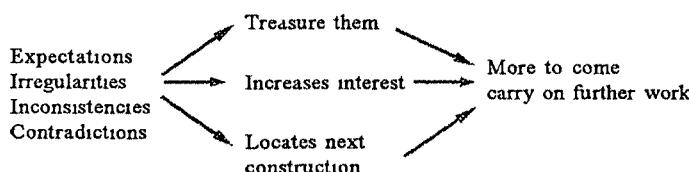


Figure 7 Bateson's Brief Theory of Consequences of Exceptions

It seems important to note that Bateson was a biological experimentalist par excellence and that we are more qualitative psychological, social science, and educational inquirers. That suggests that the similarities among times, subject matter domains, and research methods have important commonalities, ones not to be ignored in the larger discussion of scholarly inquiry in education and social science.

Bateson's discussion ripples through a number of additional experiments with quite varied plants and animals, ideas large and small, basic science and applications, and predictions of the future of the science of genetics. Only his concluding paragraph and reference to Darwin need be cited here.

The time for discussion of Evolution as a problem at large is closed. We face that problem now as one soluble by minute, critical analysis. Lord Acton in his inaugural lecture said that in the study of history we are at

the beginning of the documentary age No one will charge me with disrespect to the great name we commemorate this year, if I apply those words to the history of Evolution Darwin, it was, who first showed us that the species have a history that can be read at all If in the new reading of that history, there be found departures from the text laid down in his first recension, it is not to his fearless spirit that they will bring dismay (p 49)

The ferocious conflicts within evolution and biological science in the early years of the new 20th century are only hinted at there Bateson with his profound intellect and pugnacious spirit was in the middle of those disagreements, but that, too, is another story, one to be told elsewhere The current conflicts among, on the one hand, evolution, and on the other hand, creation science, intelligent design and what should be taught in the public schools remain These conflicts suggest a large remaining agenda for psychology, social science, education, and teachers of biology and social science

Conclusions

As I look back over the beginnings of a journey into a small quite particular piece of history of science, i e anomalies, exceptions and creativity, several much larger issues have arisen and make a set of conclusions worth commenting upon at this end point This essay began as a small, friendly, jesting and needling of my qualitative research friends and colleagues who, like me, use words like discrepant cases, outliers and exceptions Yet we, they and I, never allude back to Charles Darwin who used similar terms for the conception some 150 years ago As I began my friendly four page needling I remembered and encountered a host of additional references The four-page ‘note’ grew and grew The conception expanded and expanded Soon I seemed to be on my way into some important ideas on the nature of creative inquiry within several genres and domains of research All this seemed important far beyond my original idea I remain struck by the centrality and importance of “anomalies” in my thinking about the theory and practice of educational and psychological inquiry So, as summary, conclusions and lessons learned a few concluding highlights seem in order

The first conclusion is that I seem to be working on the history of a concept—“anomalies”—that arose in the intellectual activities of several scientists For reasons that were not initially clear, but seem increasingly better understood, I believe that this kind of history, and in this instance with the idea of anomalies, is an important cut into contemporary scientific method and theory For instance, in a very small way in an earlier essay (Smith, 1997) I mused about similar issues in the history of the concept ‘attention deficit disorder,’ (ADD), that has already evolved recently, one more time, into “attention deficit hyperactivity disorder,” (ADHD) Earlier, “brain injury” and “minimal brain damage” were labels for some similar children’s behaviour I wondered about the flow of inquiry, ideas and theory, and clinical and educational practices from Strauss and Lehtinen’s *Psychopathology and Education of the Brain-injured Child* (1948) to the very recent *Driven to Distraction* (1995) by Hallowell and Ratey, which carries the subtitle “recognizing and coping with attention deficit disorder from childhood through adulthood”

And what of the considerable intellectual work in the in-between years? I have not taken the opportunity here to review Toulmin's *Human Understanding* (1972) analysis nor the earlier statement of Kuhn's *The Structure of Scientific revolutions* (1962 & 1970), both of which provide a much larger intellectual context for the evolution of scientific ideas. Still, as a working hypothesis, I remain convinced of the importance of history to those of us who do contemporary ethnographic, qualitative, or action research in the social sciences.

Second, I believe that working in several marginally related, if not separate domains, is very productive. The history of social science, the continued pursuit of contemporary educational ethnography, the biography of Nora Barlow and indirectly of Charles Darwin and the multiple facets of creativity in several smaller studies have major benefits in suggesting and clarifying an issue such as "anomalies, exceptions and discrepant cases." I guess I would phrase this stance as involvement in multiple specializations that have some possible latent connections – perhaps unwittingly a move from phenotypes to genotypes. I seem to be arguing for pursuit of latent structures and processes in quite diverse manifest events.

Third, seeing similar points made by two eminent early biologists – Darwin and Bateson and seldom having seen them cited in the relevant contemporary social science and psychological literature became an anomaly in its own right. Working mostly from Francis Darwin's "Reminiscences," which, in my words, is a kind of a participant observational or brief ethnographic portrayal, biography, or memoir, provides a methodological twist of its own. Presenting Francis Darwin's observations and interpretations has been enlightening. The central hypothesis is that by never letting an exception pass him by Darwin 'made discoveries'. Francis thought his father was especially good at exceptions yield discoveries. Beyond the specific issue of noting and acting on exceptions giving a context for specific actions, Francis indirectly and latently presents his implicit and admittedly partial cognitive theory of Darwin's creativity. Motivation enters in, a kind of intense competitiveness with nature, 'it's dogged as does it'. Later, in the biography *Nora Barlow and the Darwin Legacy* (Smith, In process), I will be able to see to what degree Nora Barlow carried further this kind of analysis in the four Darwin books and one monograph she edited, and a number of essays she did on the Darwin manuscripts. Hopefully this will represent further instances of the relation of anomalies to creativity.

Fourth, another observation arose as I tried to read Francis Darwin carefully and closely. On the first pass through his essay, I missed what in retrospect has turned out to be one of this (my?) major insights. It is the point that Darwin as an active theorizer would magnify the visibility and importance of the exception. In a sense the more one knows or the more one has on one's mind, things one is questioning or puzzling over, the more likely is an exception to be magnified in importance and not passed over or let go too quickly. That idea has the further power of being 'manipulatable,' that is, open to change within one's self or in one's teaching others to use the qualitative grounded theory kind of methodology. As I write this I am reminded of a very potent piece of social science literature that

I seldom see referred to—Gouldner's (1961) "Theoretical requirements of applied social science" He makes the point that applied social scientists must be on the look out for ideas—variables—open to change and control Those of us in education who worry along positions such as "action research," "school reform and improvement," or "the improvement of instruction evaluation" might well take notice of Gouldner's position in our attempts to improve educational practice Perhaps less open to change but equally important are what Francis called richness of imagination and judgment and evaluation within his father's array of cognitive skills Doing research is hard work, especially when one tries to move from description to theorizing, but throughout Darwin's activities he found great joy and pleasure That seems a major generalization

Fifth, an extension of the prior points lies in the fact that two biologists working over a hundred years ago within a strong positivist tradition would use the same label—"exceptions,"—that late 20th Century social scientists use in studying human action from an "interpretive" or "hermeneutic" tradition This later day tradition denies much of what came to be called positivism The entire intellectual structure has changed, but at the day-to-day working scientist level of abstraction, the individuals are caught up in the same kind of activity leading to creativity It raises questions as to whether the paradigmatic clashes are epi-phenomena rather than major rationales guiding action Now that is an anomaly beyond belief!

Sixth, another surprise was the wealth of similar labels that have been applied to the phenomenon of anomalies exception was among the earliest, discrepant cases, deviant cases, outliers, little things, and surprises extend the list In addition, a variety of metaphors is developed by other researchers While much of that discussion must await a later time and essay, a brief reference might be made Each of the labels and metaphors broadens the nature and significance of the underlying conception

As yet I have not tried to carry out an intensive unpacking and reduction of these terms into its own kind of structure Perhaps at a later date!

Seventh, the essay returns me to one of the most important, and at the time, un-rationalized procedures we developed early on in *The Complexities of an Urban Classroom* (Smith and Geoffrey, 1968) That procedure we labeled "interpretive asides," bright ideas that we included in the field notes Now a kind of order, a location in a broader more general theory of methodology, exists An interpretive aside is a report of an anomaly, an exception, a breakdown in coherence within Geoffrey or me, as ethnographers, and the educational and psychological traditions in which we had been trained, and eventually the kind of audiences we were writing to It is almost as though I had always liked the idea and now I have some more general understanding of it I look forward to others of our methodological innovations, for example "the inside-outside" stance of us as observers receiving similar rationales and context In a sense, much of our efforts as collaborators in doing the inquiry and jointly authoring the report and jointly, 50/50, sharing the royalties from the book fall into place as a kind of "collaborative action research" But that labeling was a much later and important insight It has led to critiques of others' efforts in action research Perhaps I should have been trained as an analytic philosopher!

I still do not understand the fact that we invented, at least for ourselves, a technique we called the "interpretive asides," exploited it usefully in our work, and even taught it to our students without a larger conceptualization of what it was. In effect the practice of participant observation, natural history, or ethnography out ran our understanding of the theory of methodology. That seems very important. Perhaps we have another instance of what Kaplan (1964) called "logic-in-use" contrasted with "reconstructed logic." In his view the logic in use must prove itself through the success of the inquiry. Further, it is a part of what he calls "scientific autonomy." These ideas suggest new directions for longer-term inquiry.

Eighth, summarizing a number of other recent social scientists will be fruitful in several ways for enlarging the concept of anomalies. Commonalities among statistical methods, test and measurement advocates, case study inquirers, those doing prediction studies, and those doing ethnography, biography, and history seem larger than often perceived in some corners, departments and schools in academia. Suggestions for teaching Ph.D. students seem only a short extrapolation from this analysis.

Ninth, at the level of more specific actions, I have been struck with the issue of assumptions—what we take for granted. I am not sure how one attacks the problem or assumptions. Perhaps somewhere along the way as one reviews field notes an exercise such as asking and writing down answers to the general question "what we are assuming here—and here—and here?" Advocates of team teaching and cooperative research argue that having another individual working along, observing and interacting over steps along the way is perhaps easier. Each individual with his/her own idiosyncratic background, worldview, and approaches to problem solving will do the same thing, for one's self imposed questions and for the others' questions. But easier, or should I just say, "naturally?" "Deep history" creeping in?

Tenth, the flow into more general theories of creativity arose easily as well. Early on, I wrestled with the inclusion of the broader array of Francis Darwin's observations of his father Charles. Initially I wanted to include them as context for extending the sense or meaning of "exceptions." But they became too large in scope and length for the essay I had in mind. As I included them, I began to see that several of the other investigators had written more broadly about their experiences in creative inquiry. This I found agreeable, for part of my larger and later agenda, is a desire to attack even more broadly, e.g. literature and art—the nature of creativity in art and science. This essay then expanded beyond my early intentions.

In a strange way, the very intellectual exploration in writing this essay becomes an object lesson in the substance of the role played by "anomalies, exceptions, and the unexpected" in creative work.

Note. Earlier versions were presented at the Collaborative Action Research Network (CARN) International Conference, University of East Anglia, Norwich, England, the Action Research Collaborative (ARC) in metropolitan St. Louis, at the annual symposium of the Department of Education of Washington University and as an Invited Lecture at the University of Toronto.

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Teaching: Art or Science? Implications for Teacher Training

M. A. JYOTHI

This paper discusses the concept of teaching and tries to define it scientifically. It then raises the question "Is Teaching an Art or a Science?", presents both viewpoints and discusses its dual nature. It draws attention to the limitations imposed on teacher training by viewing it completely as a science. The present scenario in Teacher Education is critiqued from three different angles-a study of Teacher Expertise by Berliner, Training in the Performing Arts and Characteristics of Expert teachers. Finally, based on these evidences, suggestions are made to improve the performance aspects of teachers in Teacher Education programmes.

Teaching is a complex activity. If the nature of this activity could be understood, it would help us improve techniques of teaching and its research, and develop better ways of imparting teacher education. This paper tries to analyse what teaching means, whether it is an art or a science and how our perception about the subject is likely to affect the way we train teachers to teach. The implications to teacher education programme are studied.

Definitions of Teaching

For us to analyse teaching and study its nature we need to define teaching. A brief survey of literature on the definitions of teaching only revealed that comprehensive definitions are very few. Defining teaching could be approached from three angles, namely descriptive, operational and scientific definition of teaching.

Descriptive Definition of Teaching

Smith, (1987) explores the linguistic origin of the word 'teach' in order to give a descriptive definition. According to him, from early times it has been associated with 'learn'. For example the Shakespearean usage, both 'teach' and 'learn' meant the same thing. 'Learn' can be traced to Middle English *lernen*, meaning to learn or teach, which in turn to Anglo Saxon *le'rnian*, the base of which is *lar*, also the root of *lore*. *Lore* originally meant learning or teaching, but is now used to mean that which is taught, especially traditional facts and beliefs. Thus the words 'learn' and 'teach' are derived from the same source.

The word 'teach' comes from Old English *taecan* that is in turn derived from the Old Teutonic *taikjan*, the root of which is 'telk', meaning 'to show' and is

traceable to Sanskrit *dic*. The term 'teach' is also related to 'token'—a sign or symbol. To teach is, according to this definition, means to show someone something through signs or symbols, to use signs or symbols to evoke responses about events, persons, observations, findings and so forth. Here, teaching is associated with the medium in which teaching is carried on.

In brief, a descriptive definition of teaching may mean 'to give information', 'to show a person how to do something' 'to give lessons in a subject', 'imparting knowledge or skill'.

Operational Definition of Teaching

An operational definition, on the other hand, is necessary to understand teaching in an unambiguous manner that is possible to observe and evaluate. This may not be achieved through a descriptive definition since such a definition is subject to interpretations based on the context. The definition given by Gage (1963) could be viewed as an operational definition. *'By teaching we mean, any interpersonal influence aimed at changing the ways in which other persons can or will behave. The influence has to impinge on the other person through his perceptual and cognitive processes, that is through his ways of getting meaning out of the objects and events that his senses make him aware of'*

This definition stresses '*interpersonal communication*' and therefore eliminates teaching through the use of text, teaching machines, computers or media alone, without a person being physically present. It also specifies the method of influence '*to impinge on the other person through his perceptual and cognitive processes*' which essentially rules out practices, such as indoctrination, propaganda or coercion, which could involve physical, physiological or economic ways of influencing another's behaviour. An operational definition could also be a technical definition of teaching.

A Scientific Definition of Teaching

A technical definition of teaching will consist of a set of sentences connected by the words '*and*', '*or*', or '*implies*' called as '*coordination of propositions*' and has the general form

$$a = df(b, c, \dots) \quad \text{where}$$

a = Teaching is effective

b = 'Teacher gives a definitional rule and positive and negative instance in teaching a concrete concept' *and/or*

c = 'Teacher gives corrective feedback to a pupil who makes a mistake' (Smith, 1987)

This implies, if conditions *b*, *c* and/or many more such conditions are met, then the chances that the student will learn are enhanced. This way of defining teaching makes it possible to observe and manipulate teaching behaviour. Such a definition can be called as the scientific definition of teaching.

Is Teaching a 'Science' or an 'Art'?

Is Teaching then a 'Science' or an 'Art'? This question has often been asked, especially in teacher training courses but usually only in a casual manner. However, if this question is answered after considerable thought, then it could affect our research as well as training methods on teaching (Dunkin, 1987)

Researchers most often quoted to have raised this question with serious thought are Gage, Highet & Eisner, Dunkin, 1987 and Delamont, 1995)

The Science of Teaching

To understand teaching as a science, one must first be able to understand what is meant by science. Gage (1963) discusses the nature of science, saying science has three objectives—Understanding, Prediction and Control

Not mere prediction or control but understanding in the light of theoretical formulation and explanation is the central aim of science. Prediction may rest on mere empirical correlations that do not necessarily make sense. Control may be achieved by techniques, which we may actually miscomprehend. We can predict the mean score on achievement tests of the high school seniors of a state from the per capita expenditure for alcohol of the teachers of the state, Or a medicine man may successfully control the behaviour of a fellow tribesman by means of hypnotic suggestion while believing a wildly erroneous explanation of how he achieves his affects. Similarly, understanding or theoretical formulation itself may not enable us to predict or control. For example, one can understand evolution as a natural process but no one has been able to predict or control it.

Thus, these three objectives of science—understanding, prediction and control, are independent and distinct

Gage (1963) says that *understanding* is the most important of the three objectives and that is the one which leads to theory building. To be able to build a theory, one must be able to interrelate a set of variables on the basis of the rules of logic. This, he says, is the goal of scientists

According to him, if one were to apply this idea to teaching, the goal of the science of teaching is to build such theory around variables concerning the behaviour of teachers and establish relationships between teaching and learning (Gage, 1964). The more these relationships are cause-effect relationships established through experimental research, rather than correlational research, the stronger would be the scientific basis and the better would be the opportunities to improve teaching (Dunkin, 1987). Replicability is yet another dimension of science that allows any researcher, anywhere, to test the relationship between any set of variables, as examined by another scientist or suggested by theory. To make teaching a scientific activity one must be able to

- build theory relating two variables—teacher behavior and student learning
- test the theory anywhere in the world
- Engage in those practices that are recommended by educational theory
- Reformulate theory as when data (on student learning) do not fit theory
- Modify teaching practices according to new theory

However, educational theory has mostly evolved out of psychological research on animals. Research based on humans, more often than not, are far removed from classroom conditions. And educational theory cannot be applied in a context-free manner as the subjects are human beings! This makes us wonder how successful we have been in applying theoretical findings to practice.

The Artistic Aspects of Teaching

In Art, we may find, Understanding, Interpretation and Expression as three important components. If science is one way, Art is another way of understanding ourselves and our surroundings. The truth that a scientist seeks is an understanding of the way the world works. The scientist hypothesizes, checks out and shares his knowledge. This knowledge has to be tested in the light of existing knowledge and empirical evidence for it to be acceptable. The artiste's search for truth is built on the principles of aesthetics and the rules of the form or school of thought. An artiste has to first understand an abstract form and then interpret new meanings within that. An artiste is always influenced by the social and cultural setting he is in. He is creating knowledge which need not be empirically tested. Acceptance of the artiste's work is gained through connoisseurship. The artiste does not stop with understanding. S/he tries to interpret and reorganize what he has perceived in his own way. If theory building is an end in science, artistic expression becomes an end in Arts.

If science tries to unearth truth in an objective way and make it common to all using reasoning, and logic, Art understands truth in a personal way. If the purpose of science is that it should be understood by all in the same way, art seeks to achieve originality at all stages of artistic pursuit-understanding, interpretation and expression. There is always a part of the artiste's values, interests, attitude, temperament, and personality that expresses itself through the art making his interpretation unique. In that sense, Art differs from Science where replicability is an important factor.

All artistic activities have an element of spontaneity and instantaneousness that make them difficult to be reproduced exactly. At the same time, they have a strong foundation made of a knowledge base and skills. The elements of the art—the basic knowledge and skills of the artiste that make his repertoire—are used every time in a different way. It is in this sense that Gage argued that artistic activities have inherent order and lawfulness that make them quite suitable for scientific analysis (Dunkin, 1987).

Applying the idea to teaching, several analogies have been given. Each of these throws light on different aspects of an artistic activity.

Travers and Dillon (1975) considered teaching as a performing art. According to them, in the performing arts, each player has to give his own interpretation of that which he wishes to portray. They derived their model from Konstantin Stanslavskis' Moscow Art Theatre where the actors become the character they portray. "If an actress is cast as Hedda Gabler, then the actress must eat, sleep, walk, dress and bathe as Hedda, not as herself." Travers and Dillon advocated that

the student teacher should become as absorbed in the role of teacher as an actress cast as Hedda' (Delamont, 1995 6)

Stern (1963) gives an analogy to stress the instantaneous nature of artistic activity. He describes two famous works of Picasso "Guernica" and "The Minotaur" where Picasso uses the technique of distortion. Stern points out that the technique employed is understandable and reproducible by anyone who may choose to adopt it. What cannot be reproduced again, by Picasso or by anyone else, is the unique understanding, which this artist felt for his subject at those moments in time, and the unique combination of symbols he employed to communicate this understanding to his audience. Teaching is "*communication and projection of an essentially private experience* *the essence of the teacher's art is the teacher's unique understanding of his subject matter, and the unique combination of symbols which he employs on some particular occasion to communicate this understanding to his pupils*"

The Dual Nature of Teaching

In addition to the use of techniques suggested by empirical evidence, teaching involves an element of spontaneous communication between teacher and pupil, a form of self-expression requiring genuine creativity (Stern, 1963). In this, he says the teacher is more like a jazz musician who 'just accepts the discipline of form and structure but begins afresh on each occasion, once having begun, must complete the creative act for better or worse within a fixed time interval, innovates with deliberate impulsivity, and never repeats his creation in quite the same way'

Gage saw teaching '*As a practical art, teaching must be recognized as a process that calls for intuition, creativity, improvisation and expressiveness-a process that leaves room for departure from what is implied by rules, formulas and algorithms*' Here, he discusses the tension between rules and formulae on the technical side and creativity on the artistic side (Delamont, 1995)

The distinction between 'Science' and 'Art' made by Gage is referred to as 'cognitive' and 'non-cognitive' aspects of teaching by Stern (1963) and 'technicity' and 'indeterminacy' by French sociologists Jamous and Peloille (in Delamont, 1995 7). While the measures of intelligence, aptitude, achievement and performance consciously organized as conceptual schemata are called as '*cognitive variables*', measures of individual differences in attitudes, values, interests, appreciations, adjustments, temperament and personality which are found to affect the creative process are termed as '*non-cognitive variables*'

Jamous and Peloille argued that all occupations involve two contrasting type of skills and knowledge. Technical and indeterminate. Technical skills and knowledge are the explicit, rule-governed, codified parts of the job

For example, for a London Taxi driver, having a clean driving license and passing a test on 'the knowledge' a detailed examination of factual material on London streets, stations, hotels, taxi routes and short cuts constitute 'technical skills' Dealing with drunks, bewildered tourists, the police, other drivers and hotel doormen involve 'indeterminate skills' Similarly, a policeman has to know

how to caution a suspect and what local laws are. If these are his technical skills, then knowing when to caution and when to arrest, when to call for back-up and when to go in, how to cope with both criminals and victims and distinguish between them, become his indeterminate skills

For Gage, a teacher has to have subject matter knowledge and a grasp of the research on teacher effectiveness-the scientific basis and that is Jamous and Peloille's 'technicity' (Delamont, 1995 7-8)

Highest says, "*I believe that teaching is an Art, not a science. Teaching is not like inducing a chemical reaction, it is much more like painting a picture or making a piece of music, or on a lower level like planting a garden or writing a friendly letter. You must throw your heart into it, you must realize that it cannot all be done by formulas, or you will spoil your work, and your pupils, and yourself*" (Stern, 1963) As far as teaching is concerned, one can never go by rules as one would, say, conduct a reaction in chemistry-Just mix the right reactants in the right proportions, apply the right conditions and your products are ready! Whatever psychology has contributed in the form of learning theories, it has not developed principles of learning adequate to be applied to the full range of classroom processes (as cited in Stern, 1963)

To conclude, if scientific analysis of teaching and theories based on empirical evidence form the basis for rules and formulae for teaching, what is important is to develop in student teachers a sense of artistry in applying rules and formulae to context. This involves 'intuition', 'creativity', 'throwing your heart' or 'indeterminate skills'. There is no doubt that knowledge of the ground rules is necessary, but one should also have discretion in using them. Teaching is closer to the Performing Arts rather than to the Visual Arts as it has a dynamic performance element and the strong influence of the audience

Implications for Teacher Education Programmes

The concept of teaching-as a scientific endeavor or as an artistic one influences teacher training. The need for effective teachers is in the classroom and Teacher Education Institutes are required to meet this need. Most teacher education programmes seek to provide its students a clear theoretical understanding of subject matter, pedagogy and develop in them skills of applying these in the classrooms. Student teachers need both 'technical skills' and 'indeterminate skills' in their profession. Subject matter knowledge alone or possessing cognitive skills (like planning, selection and organization of material) alone do not ensure successful teaching. Teaching involves communication skills, dealing with people and unanticipated responses, an ability to allow the teaching-learning process to evolve spontaneously, all of them being performance elements (not in the sense of entertainment) with the purpose of ensuring learning. Are teacher education Institutes fulfilling this need?

We will evaluate teacher education programmes from three main angles

- 1 To see if teacher training being provided today is suitable to student teachers, one needs to understand the characteristics of student teachers and their

needs at that stage. Therefore, Berliner's (1995) five-stage theory on Teacher expertise is presented

2. A parallel is drawn between Berliner's stages of teachers and stages that an artiste (performing) passes through. Training in the performing arts is studied for gaining insight into training time, training methods, and development of creativity
3. A set of characteristics of expert teachers proposed by Berliner is given which could serve as a qualitative goal to be reached by teachers eventually

Based on these three angles, implications for Teacher Education have been drawn

Five-Stage Theory of Teachers

Berliner lists five stages that every teacher invariably has to go through—*novice, advanced beginner, competent, proficient, and expert*. He adds that not all would go on to reach the stage of proficient or expert teacher, but definitely most of them reach the competent teacher stage with experience. Berliner's study on expertise also shows that experience is a prerequisite for expertise to develop in all professions. We will briefly have a look at the characteristics of teachers at the various stages as studied by Berliner.

The Novice Stage

At this stage, the elements of the teaching tasks are labeled and learned. The teacher at this stage is also learning a set of context-free-rules and meanings of them like '*higher order questions*', '*reinforcement*', '*learning disabled*'. Novices are taught rules, such as '*give praise for right answer*' '*wait three seconds after asking a higher-order question*' and '*never criticize a student*'. This is the stage for learning objective facts of the situations and for gaining experience. It is the stage at which real-world experiences appears to be far more important than verbal information. According to Berliner, student teachers and novice teachers may be considered to be at this stage."

The Advanced Beginner Stage

At this stage experience can become welded with verbal knowledge, where episodic and case knowledge is built up. Similarities across contexts are recognized. Without meaningful past episodes and cases to which experience of the present can be related, individuals are unsure of themselves, they do not know what to do or what not to do. Context begins to guide behaviour, e.g. Teachers learn that "*Praise does not always have the desired effect, as when a low-ability child interprets it as communicating low-expectations*". The novice and the advanced beginner though intensely involved in the learning process, often fail to take full responsibility for their actions. This failure occurs because they are labeling and describing events, following rules, and recognizing and classifying contexts, but not yet actively determining through personal agency what is happening. Many second-third year teachers are likely to be at this stage.

The Competent Stage

There are two distinguishing characteristics of competent performers of a skill

First, they make conscious choices about what they are going to do. They set priorities and decide on plans. They have rational goals and choose sensible means for reaching the ends they have in mind. Second, while enacting their skill, they can determine what is and what is not important. From their experience they know what to attend to and what to ignore. As a consequence, they also learn not to make timing and targeting errors. In this stage teachers learn to make curriculum and instruction decisions, such as when to stay with a topic and when to move on, based on a particular teaching context and a particular group of students.

With further experience and some motivation to succeed, most of the advanced beginners become competent teachers. Not all advanced beginners, however, are likely to reach this level. Evidence exists that some teachers remain 'fixed' at a less than competent level of performance. (Borko, 1992, and Eisenhart and Jones, 1992) Nevertheless, it is believed that many third and fourth year teachers, as well as most experienced teachers, reach a level of performance that is considered to be competent.

The Proficient Stage

Perhaps in about a fifth year, a modest number of teachers may move into the proficient stage of development, a stage at which intuition or know-how becomes prominent. To use an analogy, at some point in learning a dance step individuals no longer think about the kinds of adjustments needed; they stop counting their steps to keep time to the music and develop a more 'intuitive' sense of the situation.

Furthermore, out of the wealth of experience that the proficient individuals have accumulated comes a holistic way of viewing the situations they encounter. They recognize similarities among events that the novices fail to see. *For example, the proficient teacher may notice, without conscious effort, that today's mathematics lesson is faltering for the same reason that last week's spelling lesson failed.* At some higher level of pattern categorization, the similarities between disparate events are understood. This holistic recognition of patterns as similar allows the proficient individual to predict events more precisely, since they see more things alike and as having been experienced before.

The Expert Stage

If the novice is deliberate, the advanced beginner insightful, the competent performer rational, and the proficient performer intuitive, the expert might be categorised as often a rational. Experts have an intuitive grasp of the situation and seem to sense in nonanalytic and nondeliberate ways the appropriate response to be made. They show fluid performance, as most people do when they no longer have to choose their words when speaking, or think where to foot when walking. People simply talk and walk in a effortless manner. Experts perform in a way that is qualitatively different from the novice or the competent performer. Experts are not consciously choosing what to attend to and what to do. They are acting effortlessly and fluidly, and in a sense this is arational because it is not easily described as deductive or analytical behaviour. Though beyond the usual meaning of rational, since neither calculation nor deliberative thought are involved, the behaviour

of the expert is certainly not irrational.

Tasks carried out by experts usually work, and thus, when matters proceed without any trouble, experts are not solving problems or making decision in the usual sense. When anomalies occur, when matters do not work out as planned or something atypical is noted, deliberate analytic processes are brought to bear upon the situation. When things are going smoothly, however, experts rarely appear to be reflective about their performance.

Using Berliner's model, Eisenhart, Behm, and Romagnano (1991) made an analysis of a Teacher Education program which revealed that student teachers given the stage they are in (novice stage), are unable to take advantage of the largely theoretical courses and the experiences provided to them. Their need as they began to teach was for 'straightforward and structured strategies or routines that could be easily adapted to the classrooms where they taught', 'routines that incorporated subject matter content, kept students under control and permitted them to accumulate a stockpile of tools for later use. *'The university expects a great deal from the student teachers, including a much greater command of cognitive learning theory, pedagogy, and their applications in classrooms than Berliner's theory leads him to think student teachers can accomplish. The goals and objectives of the program were extremely ambitious with respect to Berliner's theory.'* Though just one study has been quoted here, the goals and objectives of Teacher education programs all over are close to the one studied here.

Stages of Achieving Expertise in the Performing Arts

One question that has always bothered me is that when educational theory and practice has drawn so much from so many fields like psychology, sociology, philosophy, communication, etc., why has it not taken from the performing arts in spite of having so many similarities to it? There are many stages that a performing artiste goes through

Stage 1

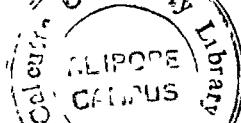
In any Performing Art training, there is a very rigorous stage of learning the basic content, skills and ground rules. This is a fairly long period lasting at least a year, when the stress is on memory, rules and grammar with constant feedback. These are just beginning exercises that equip one to perform the actual items and has very little room for creativity or originality.

Stage 2

This is followed by a stage wherein the artiste learns the actual items that can be performed eventually. These are more complicated items that make up a performance. This is accompanied by constant monitoring and feedback. It is only at this stage that a substantial bit of theory is given and connected to the practical.

Stage 3

An artiste, be it a musician, actor or dancer is allowed to perform as a full-fledged performer only when he has mastered the content, basic skills and developed an understanding of the form. He may be allowed to create or improvise on his/her



own at this stage. The performer at this stage might be quite conscious of his/her performance and presentation. She would be careful to plan the exact execution of items and is unable to handle unexpected events or problems on the stage. The emotional involvement is also quite high and the artiste takes success and failure very seriously. Many artistes hardly go beyond this stage. Art may be *enjoyable* at this stage.

Stage 4

By this stage, the performer is quite experienced in performing. It takes at least five years of performance experience to reach this stage. At this stage, the performer is at ease with what he is portraying. She no longer consciously chooses what s/he portrays. Improvisation comes almost without any effort with a sense of intuition. The form evolves on the spot. Art may be *fulfilling* to the receiver at this stage.

Stage 5

The last stage is the expert stage where the communication of the artiste becomes totally clear to the audience. The artiste has the ability to carry his/her audience to whichever emotional height s/he chooses to. S/He is totally at ease with the art, herself/himself and the receiver. Art *inspires* the receiver at this stage.

The stages mentioned above are very similar to stages of teacher expertise analysed by Berliner. What is of significance is that the set of exercises that a novice artiste gets as input, have content that is tailored specifically to develop certain skills. Performance and the content of the performance itself are taught only much later. Whereas, one cannot find such a match (between the needs of the novice teacher and the input given) in teacher education. In the performing arts, the skills form the foundation and the art forms the building above that. It is up to the artiste to build a cottage or a mansion over that. One can analyse the art and find the elements there though the foundation itself is not expected to be visible!

Characteristics of Experts

Based on many studies, Berliner also makes several propositions about expertise, some of them general to many fields and others specific to the field of teaching. They are

1. Experts mainly excel in their own domain and in particular contexts
2. Experts develop automaticity for the repetitive operations that are needed to accomplish their goals
3. Experts are more sensitive to task demands and social situations when solving problems
4. Experts are more opportunistic and flexible in their teaching than are novices
5. Experts represent problems in qualitatively different ways than do novices
6. Experts have fast and accurate pattern-recognition capabilities
7. Experts perceive meaningful patterns in the domain in which they are experienced
8. Experts may begin to solve problems slower, they bring richer and more personal sources of information to bear on the problem that they are trying to solve

The characteristics of a teacher in an 'expert stage' that Berliner talks about is the stage when teaching becomes an 'art' as referred to by Gage in the sense of '*a process that calls for intuition, creativity, improvisation and expressiveness*'

However, Berliner states that most of these propositions are based on small studies, generally qualitative and interpretative. They have tended to be descriptive rather than experimental. Therefore, it is difficult to identify expert, proficient and competent teachers, and also to develop theories. The problem he says, can be solved if one is not looking for scientifically adequate theory about the development of expertise, but look for a heuristic one. The five-stage theory here fits data well enough to allow educationists and researchers to think sensibly about the development of knowledge and skill in teaching.

Implications for Teacher Education

Training Time

Skills taught in the first two years in the performing arts *take at least two years* to manifest themselves in the individual. Looking at Berliner's five-stage theory, again, it takes a teacher *at least two years* to reach the *competent stage*. An analysis of teacher education practice today would reveal that *practice teaching* is usually for a short period of about *five to six weeks*. Skills introduced during the *microteaching* prior to that, lasting about *a week or 10 days*, are expected to be integrated and applied during this period. The skills are not given sufficient time to manifest themselves in the individual. There isn't sufficient time for learning the rules.

As a result, teachers that come out of teacher education programmes today, are hardly competent to teach. They neither know their basic rules, (which we could call the science of teaching) nor do they have an idea of how to apply them.

Theory vs. practice

In the performing arts, theory is introduced only at the third stage when students have mastered skills and are in a position to perform some items.

Teacher education programmes stress too much on theory and less on instructional skills. Cognitive skills are given more weightage than performance skills. Teacher training courses aim at providing integration of skills and that of theory and practice. Teaching practice is the first introduction to the actual classroom situation. Student teachers are still learning their basics about the ground rules of classroom behaviour. During this stage, they are still concentrating on trying out and honing their instructional skills and are unable to connect theory to their behaviours and be reflective about their own strategies (Eisenhart, *et al*, 1991). Judgment and intuition (about the strategies they employ) is possible only with experience. Theory introduced at a stage when the students are more at ease with their own strategies make the integration long lasting.

Feedback and Guidance

A unique feature of performing art education is that the teacher performance is followed by student performance with an immediate feedback from teacher. Practice

and feedback is given rigorously during the first two years in the performing arts

Performance skills take longer drill and practice to manifest themselves in a person. More time needs to be set out for practice and feedback until the student teacher is in a position to consciously choose and exhibit those skills that are apt for that context. This could be applied in teacher training by using video clippings and visual feedback. Feedback if given optimally, could be very useful.

Modeling

A student of the performing arts always has sufficient models to inspire him. The student will not be successful if he simply imitates the model, it is more important to imbibe the qualities of the expert artiste.

A student teacher requires good modeling to reach an expert stage. A novice would definitely be unable to perform like an expert. But if models are provided, then student teachers could mould growth in that direction. Some of them, with experience, are able to build on the basic skills, acquire fluency in decision-making, and achieve stages of competency followed by proficiency and expertise. Those who are hardworking and eager to teach well seem to gain more from experiences that they get. This seems to be a general characteristics of experts in all fields (Berliner, 1995). If teacher education programs are too short to develop competency, then do they at least leave impressions about what is the pinnacle to be reached in their teaching art?

Conclusion

It is high time there is a paradigm shift in Teacher Education. Teacher Education courses need to restructure their programs and evaluate some of their training methods. Courses are overburdened with theory as the field continues to borrow ideas from other fields. In this earnest desire to improve teaching, very little time is given to equip student teachers with strategies and skills that they actually require in their profession. Performance skills need to be given more emphasis than cognitive skills. Time given for practice and feedback has to be increased. Learning of theory should be problem-based. Ultimately, duration of the entire course has to be expanded to a much longer period and student teachers must be allowed to enter the professional field only when they reach at least the competent stage.

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Environmental Interest of Secondary School Students in Relation to Their Environmental Attitude

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The present investigation is intended to study the environmental interest of secondary school students in relation to their environmental attitude. The Environmental Interest Inventory and the Environmental Attitude Scale, constructed and standardized for the purpose of the present investigation, were used for collecting data from a sample of 624 secondary school students. Statistical techniques like t test and Product Moment Correlation were used for analyzing the data. The result showed that the secondary school students did not have a high level of environmental interest. A differential effect of gender and locale were observed in their environmental interest, the boys and urban subjects were found to have more interest in environmental matters compared to their rural counterparts. A high positive and significant correlation was found to exist between environmental interest and environmental attitude in all the sample groups studied.

Introduction

The last 20 years have seen growing international recognition that the challenges associated with environmental degradation and sustainable development have important implications for, and connections with, education and schooling (UNESCO, 1997). Allied with this increasing recognition for environmental education has been a concomitant growth in the field of environmental education research. Recent descriptions of the field have highlighted its rapidly expanding size and increasingly diverse nature, particularly over the last ten years (Palmer, 1998 and Hart & Nolan, 1999). The research efforts undertaken in the context of school-based environmental education have clarified the theoretical status as the measurement of the attainment variables such as environmental awareness, environmental attitude, environmental concern, pro-environmental behaviour, etc and studies on the influence of learner variables on the attainment in the field of environmental education (Ivy, *et al* , 1998, Bradly, *et al* , 1999, Kaiser, *et al* , 1999 Hwang, 2000, Olli *et al* , 2001 and Bamberg, 2003). But at the same time the research results concerning one of the most important outcome variables, viz environmental interest, are rather disappointing and hence the authors have made a modest attempt to take up the present study.

Hypotheses

In the light of above discussion and literature available for the study, the following hypotheses have been formulated

- 1 Majority of the secondary school students do not have high level of environmental interest
- 2 There is a significant difference between boys and girls in their environmental interest
- 3 There is a significant difference between rural and urban students in their environmental interest.
- 4 There will be a significant correlation between environmental interest and environmental attitude of secondary school (total sample and sub-sample based on gender and locale)

Method

Sample

The study made use of a representative sample of 624 secondary school students of Kerala, selected on the basis of 'stratified random sampling technique'. The sample consisted of 306 boys and 318 girls, the rural and urban representation being 339 and 285 respectively

Tools

Environmental Attitude Scale (EAS)

The environmental attitude of the subject was measured by using the EAS development by the authors for the purpose of the study. It is a Likert type (5-point) scale consisting of 60 statements covering 15 important thrust areas of environmental concern, viz environmental pollution, conservation of natural resources, deforestation, soil erosion, cruelty to animals, energy crisis, biodiversity, protection of wildlife, population explosion, hygiene and sanitation, sustainable environmental development, global environmental issues, environmental law, environmental education, and environmental movement. The test-retest reliability (8 weeks interval) of the scale was noted to be 0.68, and external validity to be 0.52

Environmental Interest Inventory (EII)

The environmental interest of the subject was measured by using the EII developed by the authors for the purpose of study. This standardized instrument consists of item covering different areas of general environmental interest of adolescents in the age range of 13-17. The test-retest reliability of the inventory was noted to be 0.84 and external validity was found to be 0.58

Procedure

The tools were administered on the sample in group situation under standardized conditions, their responses were collected in separate response sheets, and the total score on the EAS and EII were found out. The data thus obtained were

subjected to appropriate statistical techniques and interpreted accordingly. The mean and standard deviation for the total sample and relevant sub-samples based on sex and locale were computed and the group comparisons were done by applying the two-tailed test of significance for difference between means. Pearson's Product-Moment Correlations were used to discover the relationship between the variables within the total sample and each sub-sample separately.

Results and Discussion

The data were analysed so as to find valid answers to the objectives specified in the study. The details of the analysis are presented under appropriate subheads.

Environmental Interest of Secondary School Students

The vital statistical indices such as range, arithmetic mean (M), median (Mdn), standard deviation (s), skewness (Sk), standard error of mean (SE_M), and the population values of mean ($M_{pop\ 01}$) of the environmental interest scores for the total sample and sub-samples based on gender and locale were calculated to get a general picture of the environmental interest of the secondary school students. On the basis of the mean (M) and standard deviation (s) calculated, the total sample and sub-samples were further classified into High- (above $M+s$), Average- (between $M+s$ and $M-s$) and Low Environmental Interest (below $M-s$) groups. The details of the analysis carried out in this regard are presented in Table 1 and 2.

Table 1. Statistical Indices Pertained to Environmental Interest Scores of Secondary School Students (Total Sample and Sub-samples)

Group	N	Range	Mean	σ	Mdn	Sk	SE_M	$M_{pop\ 01}$
Total sample	624	15	13.00	4.06	13.31	-0.23	0.16	12.58-13.42
Boys	306	15	13.36	4.12	13.71	-0.26	0.24	12.75-13.97
Girls	318	15	12.65	3.96	12.96	-0.22	0.22	12.08-13.22
Rural subjects	339	15	12.67	3.96	12.86	-0.15	0.22	12.11-13.22
Urban subjects	285	15	13.39	4.13	13.95	-0.40	0.24	12.76-14.03

Table 2. Classification of the Total Sample and Sub-samples into High-, Average-, and Low Environmental Interest Groups.

Sample Groups	Levels of Environmental Interest					
	High EI* group		Average EI group		Low EI group	
	No	%	No	%	No	%
Total sample	151	24.20	330	52.88	143	22.92
Boys	85	27.77	151	49.36	70	22.87
Girls	66	20.75	179	56.29	73	22.96
Rural subject	68	20.05	185	54.56	86	25.39
Urban subject	58	20.35	198	69.47	29	10.18

*EI = Environmental Interest

The data and results presented in Table 1 clearly indicate that the sample under study is a heterogeneous one with regard to their environmental interest. The highest score obtained on the Environmental Interest Inventory is 20 and the lowest is 5 out of a possible maximum of 25, thereby producing a range of 15 for the total sample and different sub-samples based on gender and locale. The estimated value of skewness (-0.23) for the total sample shows that the scores are slightly massed at the high end of the scale and spread out more gradually towards the low end producing a negatively skewed curve, slightly deviant from the normal curve. The different sub-samples also show similar pattern of frequency distribution as evident from the obtained value of skewness. The details presented in Table 2 show that only a minority of the secondary school students under study shows high interest in environmental matters and as such they fall in the 'High Environmental Interest' group, while majority fall either in the 'Average' or in the 'Low Environmental Interest' groups. The calculated figures of Average, and Low Environmental Interest groups, together which exceeds 3/4th of the sample, indicates that the Environmental Interest of secondary school students of Kerala is low. The hypothesis formulated in the context, viz., Hypothesis 1 (*Majority of the secondary school students do not have a high level of environmental interest*), is accepted.

Comparison of the Environmental Interest of Sub-samples

The different sub-samples under study were compared to find out if there is a significant difference between the groups with respect to their environmental interest. The comparison was done using *t*-test. The results are presented in Table 3.

Table 3. Comparison of the Environmental Interest of Sub-samples

Groups	Sub-samples	N	M	s	<i>t</i> -value
Gender	Boys	306	13.36	4.12	2.19*
	Girls	318	12.65	3.96	
Local	Rural subjects	339	12.67	3.96	2.21*
	Urban subjects	285	13.39	4.13	

* Significant at 0.05 level

As evident from Table 3, there existed a significant difference between boys and girls in their environmental interest, with boys having higher scores in the variable compared to girls ($t = 2.19$, $p < 0.05$). The higher environmental interest of boys could be attributed to their wider social and physical circles, better exposure to information via all kinds of media, as well as to their enhanced opportunities to experiment with nature and its components. The hypothesis formulated in this context, viz., Hypothesis 2 (*There is a significant difference between boys and girls in their environmental interest*), is accepted.

The *t* value obtained (2.21) on comparing the rural and urban sub-samples was significant at 0.05 level. This shows that rural and urban students differed in their environmental interest, the difference being in favour of urban students. The high score on the Environmental Interest Inventory, made by urban subjects were mainly because they were more environmentally sensitive as they are often the

victims of degraded natural environment, they were better informed as they are living in a world of better media network, and they were more concerned about ever deteriorating quality of the environment in which they are living. The hypothesis formulated in this context, viz., Hypothesis 3 (*There is a significant difference between rural and urban students in their environmental interest*), is accepted.

Correlation between Environmental Interest and Environmental Attitude

The data and results pertained to the calculation of the coefficients of correlation between environmental interest and environmental attitude for the total sample and relevant sub-samples are given in Table 4.

Table 4. Coefficients of Correlation between Environmental Interest and Environmental Attitude for the Total Sample and Sub-samples.

Sample group	N	r	SE _r	r _{pop 01}
Total sample	624	0.726*	0.019	0.677 - 0.775
Boys	306	0.696*	0.029	0.620 - 0.772
Girls	318	0.752*	0.024	0.689 - 0.815
Rural subjects	339	0.718*	0.026	0.650 - 0.786
Urban subjects	285	0.731*	0.028	0.660 - 0.802

* Significant at 0.01 level

As evident from Table 4, the coefficient of correlation (*r*) between environmental interest and environmental attitude for the total sample as well as the sub-samples studied were positive and significant at 0.01 level, therefore the two variables are functionally related. Since the value of *r* for all the sample groups considered for the study lie between ± 0.60 and ± 0.80 , the variables exhibit a *high* relationship thereby indicating that any increase in environmental interest will be attended by a corresponding increase in environmental attitude and vice versa. The hypothesis formulated in this context, viz. Hypothesis 4 (*There will be a significant correlation between environmental interest and environmental attitude of secondary school students*), is accepted.

Conclusion

The following are the major conclusions of the study

- 1 The present study found that only a small proportion of the secondary school students have high levels of interest in environmental matters
- 2 A gender difference was noticed with respect to environmental interest of secondary school students, boys are more interested in environmental matters compared to girls
- 3 A locale (*rural-urban*) difference was also noticed with respect to the environmental interest of secondary school students, urban subjects having more interest in environmental matters compared to their rural counterparts
- 4 There existed *high*, positive and significant correlation between environmental

interest and environmental attitude of the total sample as well as the sub-samples based on gender and locale

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Teacher Effectiveness of College Teachers

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The study was intended to i) find out the extent of teacher effectiveness found among the college teachers ii) study the influence of personal and institutional background in teacher effectiveness of the college teachers A stratified sample of 275 college teachers was selected from 25 Arts and Science Colleges affiliated to Madurai Kamaraj University in Tamilnadu Teacher effectiveness scale and personal information schedule were used for the study The statistical techniques employed for the analysis were ANOVA and t tests The major findings in the study are 1 The majority of the college teachers are effective only at moderate level 2 Personal factors, such as age, sex, subject of teaching, designation and academic qualifications, institutional background, such as type (private / government), nature (unisex/co-ed), status (autonomous/non-autonomous), location (rural/urban) and courses offered (up to PG/above PG) have significant influence on various dimensions of teacher effectiveness

Introduction

The quality in higher education represents the standard and the effectiveness of the educational system The function of the whole educational system is to bring about learning in the student According to Skinner (1954) teaching is an art and learning is a science The task of teaching is to aid learning process The effectiveness of learning depends on the effectiveness of the teacher The teacher effectiveness refers to the capacity of the teacher to realize some of the educational objectives like desired pupil behaviour, abilities, habits, characteristics (American Educational Research Association, 1952), to bring development of basic skills, desirable attitudes and adequate personal adjustment of pupils (Ryans, 1960) Teacher effectiveness is an area of research which is concerned with the relationship between the characteristics of teachers, teaching acts and their effects on educational outcomes of classroom teaching (Flanders & Simon, 1969)

Several researchers have attempted to evaluate the teacher effectiveness in terms of teachers' professional quality Barr & Emans (1930) analysed 209 rating scales for teaching effectiveness and found in the opinion of supervisors and administrators seven characteristics, such as classroom management, instructional skill, personal fitness, scholarships and professional preparations, effects towards

self improvement in work and ability to work with others Teacher effectiveness in a classroom teaching is based on teaching competencies, such as physical fitness, personal fitness, general skills like communication and human relation, cognitive abilities, affective abilities and professional competencies (Verma, 1968, Thomas, 1991, and Vora, 1998)

In the present context, when there are more expectations and demand for quality in higher education the effectiveness of college teachers is vital to face the emerging challenges of globalization and liberalization on the one side and mushrooming of colleges on the other Hence, the investigator felt worthwhile to explore the degree of effectiveness among college teachers with respect to their personal factors and institutional background

Objectives and Hypotheses

The purpose of this study was to investigate the extent of teacher effectiveness found among college teachers and to study the influence of personal factors and institutional background of college teachers on their teacher effectiveness Based on the objectives, the following hypotheses were formulated and tested

1. The influence of personal factors of the college teachers, such as age, sex, subject of teaching, designation and academic qualifications on their teachers effectiveness was significant
2. The influence of institutional background of the college, such as type nature, status, location and courses offered in the college on their teacher effectiveness was significant

Method

Sample

The study was carried out on a stratified sample of 275 college teachers selected from 25 arts and science colleges affiliated to Madurai Kamaraj University in Tamilnadu While selecting the samples due consideration was given to factors, such as age, sex, subject of teaching, designation, academic qualifications and background of the colleges with respect to type, nature, status, location and courses offered in the colleges

Tools

The data were collected by administering the teacher effectiveness scale and personal information schedule

Teacher Effectiveness Scale

The adopted Teacher effectiveness scale (Arockiadoss, 1999) developed by Arunachalam (1997) was used for the study The scale has ten dimensions related to teacher effectiveness The operational definitions of the dimensions of the scale are as follows

- i) *Advisor and Guide* Refers to the quality of the teacher who should act as advisor and guide to the students The teacher should be a model for the

students

- ii) *Rapport with Students* Refers to friendly and cooperative nature of the teachers towards their students
- iii) *Teaching Skill* Refers to the ability of the teacher in presenting knowledge to the students which covers the communicative skill and efficiency which are required for effective learning
- iv) *Classroom Management* Refers to the leadership quality of the teacher to take control of the classroom situations to deal with the slow and fast learners
- v) *Motivator* Refers to the ability of the teacher to motivate the students for effective learning
- vi) *Sense of Humour* Refers to the ability of the teacher to make the classroom climate more congenial and humorous instead of monotonous and tense
- vii) *Mastery in the Subject* Refers to the in depth knowledge of the teacher in the subject
- viii) *Involvement in College Activities* Refers to the participation of the teacher in co-curricular and extracurricular activities of the students
- ix) *Evaluation* Refers to the evaluation of the students and self evaluation of the teacher himself
- x) *Respect to the Rules of the Institution* Refers to the teachers discipline and respect for the rules which bring harmony in thinking and feeling

The scale has 40 statements. The samples were asked to respond to the statements on four point scale Always, Frequently, Occasionally and Never. The scores were assigned 3, 2, 1, 0 respectively. The score above Mean + 1 SD was considered as high teacher effectiveness and Mean -1 SD was considered as low teachers effectiveness. The score in between was considered as average teacher effectiveness. The Cron Back Alpha reliability and validity coefficients obtained are 0.84 and 0.91 respectively. The Inter correlation among the dimensions are shown in Table 1

Table 1. Inter-correlation among the Dimensions of Teacher Effectiveness Scale

Dimensions	1	2	3	4	5	6	7	8	9	10	11
Advisor & Guide		**	**	**	**	**	**	**	**	**	**
	1 0	39	58	22	27	17	48	44	38	22	66
Rapport with Students			**	**	**	**	**	**	**	**	**
	1 0	42	38	50	46	49	52	21	33	74	
Teaching Skill				**	**	**	**	**	**	**	**
	1 0	21	36	25	46	48	35	21	68		
Classroom Management					**	**	**	**			**
	1 0	31	34	24	32	14	12	53			
Motivator						**	**	**	**	**	**
	1 0	34	44	33	26	29	64				

Sense of Humour	1 0	39	39	09	20	59
Mastery in Subject			**	**	**	**
Involvement in College activities	1 0	51	27	.43	75	
Evaluation				1 0	**	**
Respect to rules of Institution					21	50
Total Effectiveness					1 0	

* significant at $P < 0.1$ level, ** significant at $P < 0.01$ level

Personal Information Schedule

The personal information schedule has variables, such as age, sex, subject of teaching, designation, academic qualifications and college background. The college background information covers type, nature, status, location and courses offered. Type of the college means whether it is a private or government college. Nature of the college refers to whether it is unisex (Mens' College/Womens' College) or co-educational. Status of the college refers to whether it is autonomous or non-autonomous. Location refers to whether the college is situated in rural or urban area. The courses offered in the college are classified into two colleges offering up to postgraduate courses and colleges offering above postgraduate level courses such as M Phil and Ph D programmes.

Statistical Analysis

Depending on the score as mentioned above, the subjects were grouped as high, moderate and low teacher effectiveness. The scores in various dimensions of teachers effectiveness were grouped according to personal factors and institutional background. ANOVA and *t* tests were used wherever necessary.

Results and Discussion

The levels of teacher effectiveness found among the teachers were grouped as high, average and low. Their percentage in the total sample is shown in Table 2. Teachers with high level of Teacher effectiveness are found to be 18% and those with low level of effectiveness are 15% and the rest 67% are with average effectiveness. The data shows that majority of the college teachers are effective only at moderate level.

Table 2. Teacher Effectiveness among College Teachers

Level of teacher effectiveness	No. of samples	Percentage
High level	51	18
Average level	183	67
Low level	41	15
Total	275	100

The scores of teachers in different dimensions of teacher effectiveness were grouped according to their age (Table 3) The score in evaluation sub-dimension alone was found to be significantly higher among teachers in the age of group 36-45. This indicates that the teachers are effective in their self-evaluation and evaluation of students in their middle age group.

Table 3. Analysis of Variance between Age of College Teachers and Teacher Effectiveness

Dimensions of teacher effectiveness	Age groups						Total N = 275	F Prob- ability	Sig			
	I Below 35 N=60		II 36-45 N=102		III Above 46 N=113							
	M	SD	M	SD	M	SD						
Advisor & Guide	9.55	2.14	9.48	2.14	9.17	2.49	9.37	2.28	0.475	NS		
Rapport with students	9.65	1.87	9.59	2.20	9.49	2.22	9.57	2.14	0.888	NS		
Teaching skill	9.52	1.38	9.15	1.98	8.98	2.26	9.16	1.99	0.245	NS		
Classroom	7.42	2.00	7.08	1.97	7.06	1.93	7.15	1.96	0.479	NS		
Management												
Motivator	8.38	1.80	8.52	1.92	8.27	2.02	8.39	1.93	0.630	NS		
Sense of humour	7.63	2.41	8.04	2.33	8.21	2.75	8.02	2.53	0.358	NS		
Mastery in the Subject	9.10	1.99	9.59	1.97	9.57	2.19	9.47	2.07	0.289	NS		
Involvement in college	8.12	2.06	8.32	1.98	7.59	2.66	7.97	2.31	0.059	NS		
Evaluation	7.43	1.84	8.15	2.00	7.45	2.13	7.71	2.05	0.022	S* II vs III		
Respect to the rules of institution	8.65	1.79	8.76	1.78	9.04	1.96	8.85	1.86	0.363	NS		
Total teacher effectiveness	85.45	11.62	86.69	12.87	84.83	14.77	85.65	13.42	0.595	NS		

*significant at P< 0.05 level, NS = Non Significance

The scores of teachers in different dimensions of teacher effectiveness are grouped according to their sex (Table 4) The teacher effective dimensions like advisor and guide, teaching skill, motivating skill and evaluation are significantly different between men and women teachers. The women teachers are found to be effective advisor and guide, and have better teaching skill and evaluation than men teachers. The men teachers are found to be effective motivators.

Table 4. Sex of College Teachers and Teacher Effectiveness

Dimensions of teacher effectiveness	Men N=172		Women N=103		t test Probability	Sig
	M	SD	M	SD		
Advisor & Guide	8.95	2.32	10.05	2.04	0.000	S***
Rapport with students	9.48	2.24	9.71	1.95	0.380	NS
Teaching skill	8.84	2.09	9.69	1.69	0.000	S***
Classroom management	7.17	1.92	7.11	2.02	0.803	NS

Motivator	8.56	1.98	8.08	1.81	0.043	S*
Sense of humour	8.15	2.46	7.81	2.65	0.305	NS
Mastery in the subject	9.59	2.16	9.26	1.92	0.180	NS
Involvement in college activities	7.91	2.36	8.08	2.23	0.540	NS
Evaluation	7.45	2.08	8.13	1.93	0.007	S**
Respect to the rules of institution	8.86	1.85	8.84	1.89	0.913	NS
Total teacher effectiveness	84.98	14.93	86.79	11.50	0.253	NS

* Significance at $P < 0.05$ level, ** Significance at $P < 0.01$ level, *** Significance at $P < 0.001$ level
NS=Non Significance

The dimensions of teacher effectiveness like mastery in the subject, involvement in other activities of the college were found to be significantly high among arts teachers when compared to science teachers (Table 5)

Table 5. Subject of Teaching of College Teachers and Teacher Effectiveness

Dimensions of teacher effectiveness	Science N=172		Arts N=103		<i>t</i> test Probability	Sig
	M	SD	M	SD		
Advisor & Guide	9.43	2.26	9.26	2.32	0.598	NS
Rapport with students	9.48	2.18	9.67	2.08	0.452	NS
Teaching skill	0.17	1.95	9.15	2.05	0.967	NS
Classroom management	7.29	1.98	6.97	1.93	0.174	NS
Motivator	8.53	1.89	8.20	1.97	0.162	NS
Sense of humour	7.81	2.60	8.27	2.42	0.132	NS
Mastery in the subject	9.23	2.05	9.77	2.07	0.031	S*
Involvement in college activities	7.69	2.37	8.32	2.19	0.024	S*
Evaluation	7.75	2.02	7.65	2.08	0.690	NS
Respect to the rules of institution	8.97	1.86	8.69	1.86	0.225	NS
Total teacher effectiveness	85.37	13.84	86.01	12.92	0.693	NS

* Significance at $P < 0.05$ level, NS=Non Significance

When teachers were compared according to their designation (Table 6) the total teacher effectiveness and factors like sense of humor and mastery in the subject were found to be significantly higher among selection grade lecturers who were mostly in the age group of 36-45. This is consistent with the data obtained between teacher effectiveness and age where the skill in evaluation (Table 3) found to be higher in the same age group

When teacher effectiveness was compared according to their academic qualifications (Table 7) the factors, such as motivation and sense of humour were found to be higher among teachers with Ph. D. qualifications. This shows that the research experience increases the teacher effectiveness

The first hypothesis is accepted since the personal factors such as age, sex, subject of teaching and academic qualification were found to influence the teacher effectiveness

Table 6. Analysis of Variance among College Teachers Having Different Designations and Teacher Effectiveness

Dimensions of teacher effectiveness	Designations										F Probabi- lity	Sig		
	I L N=55		II SL N=89		III SGL N=85		IV HOD N=46		Total 275					
	M	SD	M	SD	M	SD	M	SD	M	SD				
Advisor & Gunde	9.11	2.27	9.08	2.24	9.62	2.29	9.36	2.28	9.36	2.28	0.206	NS		
Rapport with students	9.16	1.98	9.41	2.15	9.75	2.18	10.00	2.12	9.57	2.13	0.176	NS		
Teaching skill	9.27	1.68	8.88	1.93	9.31	2.18	9.28	2.11	9.16	1.99	0.484	NS		
Classroom management	7.31	2.18	7.03	2.01	7.08	1.94	7.28	1.60	7.14	1.95	0.806	NS		
Motivator	8.04	1.99	8.33	1.72	8.45	2.14	8.78	1.81	8.38	1.93	0.275	NS		
Sense of humour	7.29	2.38	7.65	2.19	8.64	2.59	8.39	2.91	8.02	2.53	0.006	*** III vs I		
Mastery in the subject	8.58	2.17	9.26	1.78	10.14	1.94	9.67	1.94	9.47	2.07	0.000	*** III vs I,II		
Involvement in college activities	7.65	2.17	7.86	2.10	8.15	2.49	8.26	2.50	7.97	2.31	0.483	NS		
Evaluation	7.18	2.05	7.94	2.07	7.76	1.97	7.76	2.08	7.71	2.05	0.178	NS		
Respect to the rules of Institution	8.29	1.92	9.05	2.00	9.06	1.48	8.73	2.04	8.85	1.86	0.062	NS		
Total teacher effectiveness	81.89	13.13	84.58	13.12	87.96	13.22	87.95	13.79	85.65	13.41	0.031	S* IV III vs I		

* Significance at $P < 0.05$ level, ** Significance at $P < 0.01$ level, *** Significance at $P < 0.001$ level
 NS = Non Significance

Table 7. Analysis of Variance among College Teachers with Different Academic Qualifications and Teacher Effectiveness

Dimensions of teacher effectiveness	Academic qualifications								F Probability	Sig		
	I PG N=65		II M Phil N=167		III Ph D N=43		Total 275					
	M	SD	M	SD	M	SD	M	SD				
Advisor & Guide	9.80	2.28	9.34	2.31	8.84	2.10	9.36	2.28	0.095	NS		
Rapport with students	9.86	1.98	9.40	2.11	9.76	2.46	9.57	2.13	0.271	NS		
Teaching skill	9.17	1.97	9.12	2.07	9.30	1.78	9.16	1.99	0.886	NS		
Classroom management	7.57	1.67	7.05	2.07	6.83	1.85	7.15	1.96	0.120	NS		
Motivator	8.80	1.75	8.09	1.91	8.88	2.12	8.38	1.93	0.007	*** II vs III		
Sense of humour	8.39	2.86	7.72	2.45	8.65	2.14	8.02	2.53	0.040	S* III vs II		

Mastery in the subject	9.84	1.97	9.41	2.11	9.16	2.01	9.47	2.07	0.198	NS
Involvement in other college activities	8.28	2.39	7.82	2.31	8.14	2.21	7.97	2.31	0.355	NS
Evaluation	8.08	2.25	7.61	1.94	7.53	2.11	7.70	2.05	0.242	NS
Respect to the rules institution	9.03	1.63	8.87	1.88	8.48	2.07	8.85	1.86	0.323	NS
Total teacher effectiveness	88.82	12.76	84.43	13.77	85.65	12.49	85.65	13.42	0.081	NS

* Significance at $P < 0.05$ level, ** Significance at $P < 0.01$ level, NS = Non Significance

The scores of college teachers in different dimensions of teacher effectiveness were grouped according to their institutional background (Tables 8 – 12) Though there were no significant differences in the total teacher effectiveness among college teachers with respect to institutional background there were significant differences in number of dimensions of teacher effectiveness

Involvement in other activities of the college are found to be high in private college teachers whereas in government college teachers respect to the rules are found to be higher (Table 8) This shows the existence of academic freedom of Private Colleges

Table 8. Institutional Background: Type of College of Teachers and Teacher Effectiveness

Dimensions of teacher effectiveness	Private N=125		Government N=60		<i>t</i> test Probability	Sig
	M	SD	M	SD		
Advisor & Guide	9.46	2.15	9.00	2.70	0.218	NS
Rapport with students	9.63	2.15	9.33	2.09	0.333	NS
Teaching skill	9.20	1.85	9.00	2.45	0.550	NS
Classroom management	7.13	1.96	7.00	1.96	0.517	NS
Motivator	8.43	1.94	8.23	1.89	0.487	NS
Sense of humour	8.00	2.45	8.10	2.83	0.804	NS
Mastery in the subject	9.40	2.12	9.72	1.89	0.273	NS
Involvement in college activities	8.15	2.35	7.35	2.07	0.011	S*
Evaluation	7.70	2.03	7.70	2.13	0.982	NS
Respect to the rules institution	8.70	1.85	9.38	1.81	0.012	S*
Total teacher effectiveness	85.89	13.46	84.82	13.33	0.584	NS

Significance at $P < 0.05$ level, NS = Non Significance

With respect to the nature of the college dimensions, such as advisor and guide and teaching skills were found to be high among the teachers of either mens' or womens' college (unisex colleges) and the motivator factor was found to be higher among the teachers' of co-educational colleges (Table 9)

Table 9. Institutional Background: Nature of College of Teachers and Teacher Effectiveness

Dimensions of teacher effectiveness	Nature of college				<i>t</i> test Probability	Sig		
	Unisex N=162		Co-ed N=113					
	M	SD	M	SD				
Advisor & Guide	9.64	2.13	8.98	2.44	0.022	S*		
Rapport with students	9.74	2.10	9.33	2.17	0.123	NS		
Teaching skill	9.39	1.87	8.82	2.13	0.022	S*		
Classroom management	7.19	2.01	7.08	1.88	0.594	NS		
Motivator	8.18	1.86	8.67	1.99	0.042	S*		
Sense of humour	7.93	2.53	8.16	2.54	0.453	NS		
Mastery in the subject	9.29	2.03	9.73	2.11	0.093	NS		
Involvement in college activities	8.05	2.31	7.87	2.32	0.542	NS		
Evaluation	7.82	1.90	7.55	2.24	0.304	NS		
Respect to the rules institution	8.75	1.88	9.00	1.83	0.266	NS		
Total teacher effectiveness	85.98	12.71	85.19	14.42	0.637	NS		

* Significance at $P < 0.05$ level, NS = Non Significance

When the teachers of autonomous colleges were compared with that of non-autonomous colleges, the dimensions of teacher effectiveness, such as teaching skill, sense of humour and involvement in college activities were found to be higher among the teachers of autonomous colleges (Table 10)

Table 10. Institutional Background: Status of College of Teachers and Teacher Effectiveness

Dimensions of teacher effectiveness	Status of College				<i>t</i> test Probability	Sig		
	Autonomous N=86		Non-autonomous N=189					
	M	SD	M	SD				
Advisor & Guide	9.45	1.97	9.33	2.42	0.649	NS		
Rapport with students	9.86	2.04	9.43	2.17	0.117	NS		
Teaching skill	9.65	1.79	9.02	2.07	0.033	S*		
Classroom management	7.23	1.66	7.13	2.08	0.589	NS		
Motivator	8.51	1.98	8.32	1.91	0.472	NS		
Sense of humour	8.66	2.10	7.73	2.66	0.002	S**		
Mastery in the subject	9.71	1.97	9.36	2.11	0.191	NS		
Involvement in college activities	8.38	2.22	7.79	2.33	0.046	S*		
Evaluation	7.45	2.14	7.82	2.00	0.180	NS		
Respect to the rules institution	8.87	1.72	8.84	1.92	0.895	NS		
Total teacher effectiveness	87.59	12.59	84.77	13.72	0.096	NS		

* Significance at $P < 0.05$ level, ** Significance at $P < 0.01$ level, NS = Non Significance

There were no significant difference in the dimensions of teacher effectiveness between the teachers of rural and urban colleges (Table 11). The dimensions like rapport with the students, higher motivating skill and mastery in the subjects were found to be higher among the teachers of colleges offering research degrees above PG level (Table 12). It is interesting to note that colleges involved in research provided opportunity to the teachers to have more rapport with students, to be highly motivating and to acquire mastery over the subject.

Table 11. Institutional Background: Location of College of Teachers and Teacher Effectiveness

Dimensions of teacher effectiveness	Location of college				<i>t</i> test Probability	Sig		
	Rural N=86		Urban N=189					
	M	SD	M	SD				
Advisor & Guide	9.33	2.37	9.42	2.15	0.747	NS		
Rapport with students	9.44	2.15	9.76	2.11	0.220	NS		
Teaching skill	9.05	2.18	9.35	1.64	0.197	NS		
Classroom management	7.16	1.92	7.13	2.03	0.894	NS		
Motivator	8.32	1.92	8.49	1.95	0.485	NS		
Sense of humour	7.92	2.64	8.18	2.34	0.398	NS		
Mastery in the subject	9.33	2.08	9.71	2.05	0.135	NS		
Involvement in college activities	7.83	2.22	8.23	2.45	0.169	NS		
Evaluation	7.56	2.00	7.95	2.11	0.125	NS		
Respect to the rules institution	8.78	1.91	8.96	1.78	0.436	NS		
Total teacher effectiveness	84.72	13.73	87.19	12.81	0.132	NS		

NS = Non Significance

Table 12. Institutional Background: Courses Offered in Colleges of Teachers and Teacher Effectiveness

Dimensions of teacher effectiveness	Courses Offered				<i>t</i> test Probability	Sig		
	Up to PG N=168		Above PG N=107					
	M	SD	M	SD				
Advisor & Guide	9.29	2.47	9.49	1.94	0.435	NS		
Rapport with students	9.36	2.11	9.88	2.16	0.048	S*		
Teaching skill	9.04	2.14	9.35	1.74	0.198	NS		
Classroom management	7.11	1.97	7.21	1.95	0.684	NS		
Motivator	8.17	1.92	8.73	1.91	0.018	S*		
Sense of humour	7.89	2.57	8.22	2.46	0.286	NS		
Mastery in the subject	9.26	2.14	9.81	1.93	0.026	S*		
Involvement in college activities	7.78	2.34	8.28	2.25	0.081	NS		
Evaluation	7.79	2.02	7.57	2.09	0.387	NS		
Respect to the rules institution	8.81	1.93	8.90	1.76	0.087	NS		
Total teacher effectiveness	84.51	13.81	87.46	12.63	0.070	NS		

* Significance at $P < 0.05$ level, NS = Non Significance

The second hypothesis was accepted since the institutional background such as the type, nature, status and courses offered were found to influence some of the components of teacher effectiveness of the college teachers

Conclusion

The important conclusions derived from this study are as follow

- 1 Majority of the college teachers were effective only at the moderate level
- 2 College teachers in the age group of 30-45 were effective in their subjects, sense of humour and self evaluation
- 3 Women teachers were effective in advising and guiding and possessed better skills of teaching and evaluation Men teachers were effective motivators
- 4 Arts teachers had higher mastery in their subjects and involvement in college activities
- 5 Private college teachers showed more involvement in College activities
- 6 Autonomous College teachers were equipped with higher teaching skills and were more involved in college activities
- 7 Teachers involved in research and with research, degrees had mastery over their subjects, motivating skill and developed rapport with the students effectively

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Environmental Education Awareness Among Elementary School Teachers

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The study was conducted on 1800 elementary school teachers to study their environmental education awareness with respect to their residential background, sex and subject specialization. A self-made questionnaire was used to collect the data, which was treated with statistical techniques. Results revealed significant variation in the environmental education awareness with regard to their residential background and subject specialization. However, no significant variation was observed in relation to the sex of elementary school teachers.

Environment, which is under threat locally, nationally and globally, has become the concern of all the academicians, intellectuals, scientists, policy makers and government across the continents. The realization that we are on the path of self-destruction has dawned on many individuals, organizations and nations. There are many campaigns for environmental awareness and for banning activities that endanger environment. However, these are only external and superficial measures that do not get to the root of the problem (Mishra & Airen, 1994). Solving environmental problems requires greater cooperation and coordination between nations both at the regional level and also worldwide level leading to attitudinal shift among the masses.

Global concern regarding the steadily deteriorating state of the environment has emphasized the need for education. Education, obviously a powerful vehicle bringing about change, a panacea of all evils and a potent weapon for prevention plays a central role in the society. The need of the hour is to make people sensitive towards nature through a strong programme of environmental education (Nachimuthu & Vijayakumari, 1993). Environmental education is a way of creating knowledge, understanding, values, attitudes, skills, abilities and awareness among individuals and social groups towards the environment and environment protection.

In this regard, it is the colleges and universities, which have a very important role to play as they contain more mature class of students at the one hand, and well developed faculties for research and development on the other (Neelima & Nair, 2001). School system provides the largest organized base for environmental education and action. With children in this plastic age, school offers an effective instrument for imbedding in them the desirable environmental ethic. Teacher is one

of the important factors, which is bound to affect this programme. They can provide a vital link in the delivery of environmental knowledge, its associated problems and their solutions.

By and large, research in this area indicates that although environmental education is taken up as a subject in the curriculum the subject faces certain limitations in regard to its proper implementation. The loophole is surely the lack of attitude of the teacher. The teacher should be aware of the environmental education aspects only then he can make the future generation aware of the environmental problems and their solutions. Taking into consideration this situation, the investigators felt a need to conduct a study to know about the environmental education awareness of elementary school teachers in relation to residential background, subject specialization and sex so that necessary actions could be taken up to come forward with prolific results for enhancing the efficacy of the content provided to them as well as sustain their inner urge for desirable actions.

Research Methodology

The present study is an attempt to examine the environmental education awareness of elementary school teachers in relation to residential background, sex and subject specialization. This section explains the hypotheses, tools, sample and statistical techniques used for the study.

Hypotheses

Following null hypotheses were formulated for testing the assumptions

- a) There is no significant difference in the environmental education awareness between urban and rural elementary school teachers
- b) There is no significant difference in the environmental education awareness between male and female elementary school teachers
- c) There is no significant difference in the environmental education awareness among elementary science, social science and language school teachers

Tools

The study was conducted with the help of a self-made questionnaire whose reliability and validity was tested. The reliability coefficient of the questionnaire by test-retest method was found to be +0.99. After standardizing the tool, the final draft of the questionnaire consisted of 100 multiple-choice items. Each item consisted of two parts, viz (i) a stem and (ii) four choices (a, b, c and d). As there were 100 items, an individual could get a maximum score of 100. A schedule was also added to the response sheet to know the residential background, sex and subject specialization of the elementary school teachers.

Sample and Statistical Techniques

A total sample of 1800 elementary school teachers was selected using stratified

random sampling technique from five districts namely Amritsar, Jalandhar, Kapurthala, Nawanshahar and Gurdaspur. The teachers of urban and rural areas, male and female and those with science, social science and language specialization were included in the study. The detail breakup of the sample is given in Table 1

Table 1. Sample Profile

Residential background	Sex	Science	Social Science	Language	Total
Urban	Male	150	150	150	450
	Female	150	150	150	450
Rural	Male	150	150	150	450
	Female	150	150	150	450
Total		600	600	600	1800

Results

The main objective of the study was to know about the environmental education awareness of the elementary school teachers. Finding the score of the individual teachers did this. The scores obtained were tabulated and mean, standard deviation, maximum score, minimum score and median were calculated (Table 2). Representation was given to the residential background, sex and subject specialization

Table 2. Mean, Standard Deviation, Maximum Score, Minimum Score and Median of Elementary School Teachers

	Ele school teacher	Urban	Rural	Male	Female	Science	S Sci	Lang
Mean	64.39	65.4	63.4	63.9	64.9	70.7	63.5	59.0
S D	14.33	13.9	14.6	15.1	13.4	11.4	13.6	15.2
Maximum Score	90	90	90	90	90	90	90	90
Minimum Score	9	9	17	17	9	19	14	9
Median	67	68	66	67	66	72	66	61
Total Sample	1800	900	900	900	900	600	600	600

Table 3. Significance of Difference between Mean Scores

Pair of comparison	Mean difference	t value
Urban - Rural	1.99	2.95**
Male - Female	-1.02	-1.51
Science - Social Science	7.15	9.87**
Science - Language	11.73	15.1**
Social Science - Language	4.58	5.50**

**Significant at 0.01 level

Table 4. Distribution of Scores into Various Quartiles with Percentage

Quartile score	Elementary school teachers	Urban	Rural	Male	Female	Science	Soc Sci-ence	Lang
0-25	31	15	16	18	13	6	10	15
%	1 7	1 7	1 8	2 0	1 4	1 0	1 7	2 5
26-50	251	108	143	145	106	27	77	147
%	13 9	12 0	15 9	16 1	11 8	4 5	12 8	24 5
51-75	1119	561	558	529	590	341	421	357
%	62 2	62 3	62 0	58 8	65 5	56 8	70 2	59 5
79-100	399	216	183	208	191	226	92	81
%	22 2	24 0	20 3	23 1	21 2	37 7	15 3	13 5
Total	1800	900	900	900	900	600	600	600
%	100	100	100	100	100	100	100	100

Table 4 shows the percentage distribution of the scores of the respondents into various quartiles

Urban-Rural

Table 2 shows that the mean of urban elementary school teachers (65.4) was higher than that of the rural elementary school teachers (63.4) showing a difference of 1.99. The value of *t* was calculated (Table 3) for this group difference and it was 2.95 and was significant at 0.01 level. This significant difference showed that urban elementary school teachers had a higher level of environmental education awareness than their rural counterparts. Further, it is clear that the percentage of urban elementary school teachers in the highest quartile was 24.0%, which was again higher than that of rural elementary school teachers, which was 20.3% (see Table 4). In the light of this finding, Hypothesis 1 was rejected.

Male-Female

Table 2 indicates that the mean of male elementary school teachers (63.9) was lower than that of female elementary school teachers (64.9) showing a difference of -1.02. The value of *t* was calculated (Table 3) for this group difference (1.51) but it was not significant at 0.05 and 0.01 levels. This non-significant difference showed that male and female elementary school teachers did not differ in their environmental awareness. Further, it is clear in Table 4 that the percentage of male elementary school teachers in the highest quartile was 23.1%, which was again higher than that of female elementary school teachers, i.e. 21.2%. In the light of this finding, Hypothesis 2 was accepted.

Science and Social Science

The mean of science teachers (70.7) was higher than that of social science teachers (63.5) showing a difference of 7.15. The value of *t* (Table 3) for this group difference was 9.87, which was significant at 0.01 level. This showed that science teachers had a higher level of environmental education awareness than social science teachers. Further, it is clear in Table 4 that the percentage of science teachers in the highest quartile was 37.70%, which was again higher than that of

social science teachers, i.e. 15.3% In the light of this finding, Hypothesis 3 pertaining to these teachers was rejected

Science-Language

The mean of science teachers (70.7, Table 2) was higher than language teachers (59.0) showing a difference of 11.73. The value of t (Table 3) for this group difference was 15.1 and was significant at 0.01 level. This showed that science teachers had higher level of environmental education awareness than the language teachers. Further, it is evident in Table 4 that the percentage of science teachers in the highest quartile of science scores was 37.7, which was again higher than that of language teachers, i.e. 13.5%. In the light of this finding, Hypothesis 3 pertaining to these teachers was rejected

Social Science-Language

Table 2 shows that the mean of social science teachers (63.5) were higher than that of language teachers (59.0) showing a difference of 4.58. The value of t (Table 3) for this group difference was 5.50, which was significant at 0.01 level. This showed that social science teachers had a higher level of environmental education awareness than language teachers. Further, it is clear in Table 4 that the percentage of social science teachers in the highest quartile was 15.30%, which was again higher than language teachers, i.e. 13.5%. Hence, Hypothesis 3 pertaining to these teachers was rejected

Conclusion

- There exists urban-rural variation in environmental education awareness. Teachers working in urban schools were more aware about environment and its related problems
- Male and female elementary school teachers showed no significant variation in environmental education awareness, thereby highlighting that sex was not the factor affecting environmental education awareness among the elementary school teachers. These findings are in agreement with that of Sundarajan & Rajasekar (1993), Pradhan (1995), Francis (2002) and Pradhan (2002). Therefore, it was concluded that both male and female elementary school teachers had equal environmental education awareness
- The subject specialization of the elementary school teachers also showed significant variation in environmental education awareness. Science teachers had significantly higher environmental education awareness than their social science and language counterparts. Significant difference was also found among social science and language teachers in environmental education awareness. Therefore, it was concluded that science teachers had higher environmental education awareness than social science and language teachers. This finding is in agreement with that of Pradhan (1995) and Pradhan (2002). The environmental education awareness of social science teachers was also higher than that of language teachers. This finding was in agreement with that of Pradhan (1995). Thus, subject specialization of the elementary school teachers had its effect on the environmental education awareness

Educational Implications

Teachers can play an important role in educating their students about environment, which is possible only when the teachers themselves have the necessary level of environmental education awareness. For this purpose, the government should introduce and enrich environmental education programmes in both in-service and pre-service teacher education programmes. More attention needs to be paid towards the teachers with rural background and the teachers with social science and language subject specialization.

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Evaluating Externally-funded Chinese Basic Education Project

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Ding Xiaohao, Huang Ping & Mark Bray (2004) *Reducing the burden of the poor household costs of basic education in Gansu, China* Hong Kong Comparative Education Research Centre, The University of Hong Kong, pp 67, Price US\$ 10, including postage ISBN 962 8093 32 0 (Further details on www.hku.hk/cerc)

While China has made a tremendous progress in economic development, the gap between the poor and the rich has widened. To support poverty-stricken areas and people, a number of national and international projects have been conducted. It is certainly helpful for policy makers, project officers and researchers who are involved in poverty alleviation project to refer to experiences of other countries. At the same time, it is necessary to consider China's specific contextual backgrounds. There would be many different ways to cope with problems that a project will bring about in a variety of settings. Therefore, more practical knowledge and skills should be learned and accumulated.

Nobody will disagree that creating equal educational opportunities is one of the most effective measures to help poor people out of poverty. Through attending schools and other training programmes, people will learn ways to raise agricultural productivity, to earn higher wages, to maintain hygienic living environments, and to make better human relations. However, whether people are or not willing to participate in classes would depend on the criteria with which they analyse costs and benefits of education.

The Gansu Basic Education Project (GBEP), which started in 1999 with funding by the Department for International Development (DFID) of the United Kingdom government, highlights increasing enrolment in poor minority areas in Gansu Province, with a particular focus on girls. Although the Chinese government has aimed at achieving universal basic education by 2010, in some regions enrolment rates are still low, and many students drop out at an early stage. This study focuses on the range and effectiveness of initiatives navigated by the GBEP to reduce the costs of schooling to households. Households assess not only direct costs of schooling but also opportunity costs. Costs of schooling have central implications for enrolment and retention in schools. This research monograph on the GBEP examines issues based on in-depth fieldwork in four project counties.

In the mid-1990s, the Chinese government decentralised educational finances, and kicked off the regional responsibility system for the provision of basic education. As a result, poor regions have been pushed to bear heavier financial and management burdens, and naturally that has particularly affected poor households. The research team found problems in financial allocations in respective project sites. For instance, financial support to schools to enable them to provide textbooks free of charge had been fixed according to the enrolments in the past, even though enrolments had continued to increase. Educational finances of the project counties were weak since subsidies given by the national government might cease to be available if and when the task of reaching universal education was concluded. Under such tight budget structure, the national policy on the limit of collecting fees was not strictly adhered to. Also, although uses of fees were announced in public, not all schools had complete records on the payment.

Regarding the opportunity costs to households, the study identifies the following two types: (1) the loss of income that arises because a child cannot work when he or she is in school, (2) the lost utility from the fact that expenditure on fees and other school-related items cannot be deployed to other uses. According to the analysis of the research team, the former was not so high since there were few employment opportunities at the project counties. Nevertheless, many dropouts helped their families with agricultural planting and stock farming. Questionnaire and interview data showed that many households could not afford sufficient fertilisers and pesticides. That means that there would have been larger agricultural yields if they had not invested in schooling. It was also indicated that the opportunity costs for minority families were usually greater than for Han families, since minority families tended to have more children than Han families.

Opportunity costs might also be different according to gender. For example, opportunity costs were likely to be greater for boys than for girls since boys were more likely to seek wage-earning employment. However, girls could undertake agricultural and even wage-earning work, and they also tended to be more actively involved in domestic duties, such as looking after younger siblings. The Muslim communities in the four project counties shared attitudes on girls with many other parts of the Islamic world, and parents usually were not so willing to invest in education for girls. They might feel that their investments had been lost when girls became women, and then got married and left to serve another family.

Aiming to reduce the household costs of schooling and to increase enrolments in poor minority areas, the GBEP focuses on six specific project components: (1) a budgetary arrangement at the government level known as the Two Commitments, (2) a scholarship scheme for poor children, (3) boarding allowances for junior middle school girls, (4) a textbook revolving fund, (5) a free-lunch programme, and (6) energy-saving buildings.

It is often seen that mechanisms that externally funded projects establish become ineffective as soon as the external funds cease to be available. The Two Commitments, which were designed to address this issue, are (1) county budgetary allocations to education in county fiscal expenditures will increase by 1 percentage

point every year. (2) the percentage share of county budgetary allocations to non-personnel expenditures, and expenditures on student financial aid in recurrent educational expenditures from county budgetary allocation, will increase by 1 percentage point every year in two counties. Compared to the national government's similar policy called the Three Increases, the Two Commitments were more detailed and imposed a stricter financial requirement on the county governments.

Many lessons were learned through promoting the policy of the Two Commitments. It had been difficult for poor counties' finances to satisfy all the requirements of the Two Commitments, particularly since a taxation reform was launched in 2002. It aimed at reducing financial burdens on peasants by stopping collection of miscellaneous fees without agreement with community people. Subsidies from upper-level governments covered the deficits that the tax reform generated. However, some schools were required to pay for items, such as water and electricity, which used to be paid by townships and villages. Changing political climates and macro-planning strategies could inevitably influence all the way down to the school level.

The scholarship and allowance schemes were more directly targeted at the needs of the poor families, at girls, and at minorities. School Development Planning committees were set up, and the criteria for scholarships and allowances were decided through the committees. At the beginning, the possibility of negative social labelling that recipients of scholarships might face was a concern. However, community members generally had very positive attitudes, and the competition for scholarships became keen. School heads had difficulty convincing some parents that they could not receive scholarships. They could have used the committee structure to improve transparency and community involvement in the selection processes, and regulations to organise and manage the committees were not followed closely in all schools. That might have reflected on the one hand the demanding nature of the regulations and, on the other hand, the lack of such processes in the cultural traditions of the people concerned.

The argument whether the rate of scholarships should be raised to cover not only the full direct costs but also some of the opportunity costs was related to issues how to make the scheme become more self-reliant and sustainable. It was not an easy task to evaluate the appropriateness of allocation methods and to look for needy students without spending a lot on administration and management. Yet, lessons will be learned little by little as further experience is gained. The GBEP already in some respects found ways to tackle matters of targeting, for instance, by steering scholarships away from county and township centre schools and towards village schools and teaching points. Free-lunch programme similarly had problems in targeting. Since the programme was implemented on institutional basis, it covered not-so-poor children as well as the poor studying in the same institution.

The Textbook Revolving Fund (TRF) was established to help low-income families to secure books at reduced cost. The GBEP provided money for the organisers of the TRF to buy the textbooks used by students in the preceding year, with the idea that the books would then be sold at prices lower than those of

new books Although a survey conducted in advance had suggested that a considerable number of students would like to use the second-hand books, few actually did purchase the books In some districts, books were purchased from primary schools in rich areas outside the district, and the collected books were delivered to poor students within the school district for free There was also a cultural issue Muslim students were unwilling to use second-hand books because they feared that Han and other non-Muslim students who could have been handling pork and had not washed their hands thoroughly might have used the books

The last component of the GBEP project was energy-saving buildings, which used solar panels to reduce the necessity for heating by coal or other needs In many schools, the cost of fuel was charged in school fees, and in other schools, pupils were asked to bring bricks of coal from their homes The solar heating systems eventually cost around 25 per cent more to construct than normal classrooms Costs could be cut through the use of locally produced materials However, even with these cost-reductions, the extra cost of the solar classrooms may be too high to justify widespread usage

Although it is impossible to summarise all the significant points here, this book covers every detail of important issues in the processes of implementing the project, and explores methods for improvement and solution. It is strongly recommended that project officers who have participated or will participate in similar projects read the book Researchers and planners in other countries will also find it very useful, both to understand practical problems and to consider theoretical questions

The following villager's words quoted at the end of this book were part of a striking conclusion "It is the first time in the history of the community that the community people are consulted on a systematic basis on the issue of the school development" Although Village Self-Rule has been promoted since the late 1980s and has made direct election of Village Committees possible in most rural areas, there have still been many obstacles for villagers to participate in processes of community development Merely investing money and introducing some institutions or systems by the top-down approach will not lead to self-reliant and sustainable community development If villagers can more clearly identify themselves as members of communities, their motives for community involvement will surely be stronger This book's thorough descriptions and analyses on the project to reduce household costs of basic education have provided very valuable insights, particularly on ways to work out more creative ways of facilitating community participation

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Sumon Kamal Tuladhar The out-of-school children's programme in Nepal an analysis

Robert C West *Education and sector-wide approaches in Namibia*

Maureen Woodhall *Cost-benefit analysis in educational planning*

(Continued from the facing page)

V Two copies of the manuscript should be sent for editorial review

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A signed article in a journal—Con, A (1984) The effect of pesticides on air quality *Consolidated Messenger*, 20, 44-60

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PERSPECTIVES IN EDUCATION

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I Manuscripts for publication that have not been published elsewhere, all correspondence regarding papers and books for review should be submitted to the **Editor-in-Chief, Perspectives in Education, 76, Kshitij, Pritam Society No. 1, BHARUCH-392001, Gujarat, India** Phone/Fax (91-02642) 229536 [Fax operative only IST 9 00 AM to 1 00 PM & 5 00 PM to 9 00 PM International users should drop "0" from 02642], E-mail pndave@satyam.net.in and pnpdave@yahoo.com (Use only one)

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(Continued on the facing page)

Relation to Motivation and Personality

Other observations and ideas seem a part of Francis' (Charles Darwin's son) implicit yet evolving theory of research creativity as exhibited by Charles Darwin. These ideas go well beyond what is usually seen as 'cognitive.' Francis' move seems toward a more general conception of the motivation and personality of the research scientist. In my view this is the point where my original 'four page note' becomes a much larger essay including the intellectual, personal, and social context for the conception of 'anomalies, exceptions, and creativity.' Francis Darwin provides a major starting point for this more general theorizing.

Another quality that was shown in his experimental work was his power of sticking to subject, he used to almost apologize for his patience, saying that he could not bear to be beaten, as if this were rather a sign of weakness on his part

"Patience" seems hardly the concept, rather **competitiveness with nature** seems closer. But simple competitiveness was only part of the story, for Francis continues

He often quoted the saying. "It's dogged as does it," and I think doggedness expresses his frame of mind almost better than perseverance. Perseverance seems hardly to express his almost fierce desire to force the truth to reveal itself. He often said that it was important that a man should know the right point at which to give up an inquiry. And I think it was his tendency to pass this point that inclined him to apologize for his perseverance, and gave the air of doggedness to his work (p 149, emphasis added)

"Doggedness" seems an extreme amount of a variable that might be labeled **intensity of motivation**. Patience and perseverance seem lesser amounts of intensity. As a kind of action, doggedness imbues both cognitive and experimental inquiry with a kind of relentlessness. One wonders about the origins, the 'if this, then that' of such a disposition.

Louis Smith
*Anomalies, expectations and creativity
 A perspective from Darwin's Natural History
 Perspectives in Education
 2005, 21, 2, 71*